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NOVEMBER 1982

SPECIAL REPORT:
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FOREST INDUSTRIES

LOGGING/PULPWOOD/FORESTRY/LUMBER/PANELS

Arizona mill saws small pine in one pass

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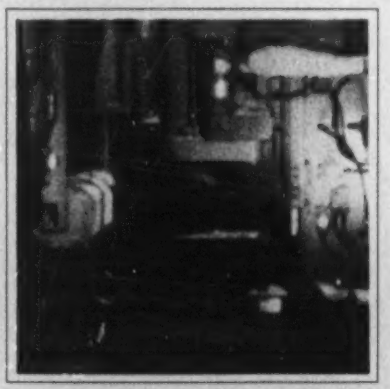

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Considerable waferboard production will exist by 1983, much of it in Northeast and North Central U.S. and in Canada east of Alberta. Markets must be broadened

Balancing supply/demand is waferboard's challenge

Vancouver, B.C.

By Peter Drake

Despite the fact that waferboard has been available commercially for more than 25 years, the need for a serious analysis of supply/demand balances has not been appreciated. That's because until very recently the supply was still relatively small compared with the potential market. Now, however, the situation is dramatically different.

(For the purposes of this analysis, the term waferboard is used throughout. It should be understood that this term includes OSB (oriented strand board) and products such as Com-Ply.)

Prior to 1978 there were only three mills in North America. This rose to eight mills later in the 1970s and, now, in 1982, there are 24 mills, with more to come. The capacity by 1980 was 10 times that of 1970. The level by 1985 is likely to be three times that of 1980. Fig. 1 shows the dramatic increase expected by 1985.

Waferboard demand

The markets for waferboard are essentially those that are satisfied by sheathing grades of plywood. In the U.S., consumption of sheathing plywood was approximately 13 billion ft² (⅜-in. basis) in 1981—down from the peak of around 16 billion ft² in 1978. Consumption had been increasing steadily for many years.

In the 1950s and 1960s this increase was due to plywood's penetration into traditional lumber uses in construction. In the 1970s strong promotional efforts of the American Plywood Assn. encouraged use in a variety of other markets. In the 1980s, waferboard is expected to penetrate plywood markets.

Any estimate of structural board consumption must relate to housing starts. A few years ago, it was confidently believed that starts should be in the 2 million plus range. Now, however, there are many prophets of doom who predict figures as low as 1.2 million starts for an average over the 1980s.

I believe this is unrealistically pessimistic. A more likely estimated would appear to be for an average in the range of 1.6 to 1.8 million from 1983 on. This is close to the estimates being made by the National Assn. of Home Builders.

On the basis of this assumption, and projecting continued participation in other market sectors, it is expected that the market for structural panels will grow slowly throughout the 1980s. The increases seen in the 1970s are not likely to be sustained. It is expected that actual consumption rates will remain cyclical, with substantial variations from year to year, even though the straight line trend may be for a steady growth.

The penetration of waferboard is expected to reach a level of 20% of the total U.S. market by 1990. This may be regarded by some as too low, but it is the result of the location of the plants. A very large proportion of the production is located in the Northeast and North Central regions of the U.S. Because of transportation costs, it is unlikely that significant volumes of waferboard produced in these regions will be sold in the South or West.

Therefore, waferboard consumption must be related to demand in the Northeast and North Central regions. Analysis of available statistics from the APA and elsewhere indicates that consumption in these regions has been dropping as a percentage of total U.S. This percentage is currently 30%. On the assumption that this decline will be halted, it can be estimated that by 1990, on a trend basis, the total consumption of structural panels will be around 5 billion ft² in the two regions.

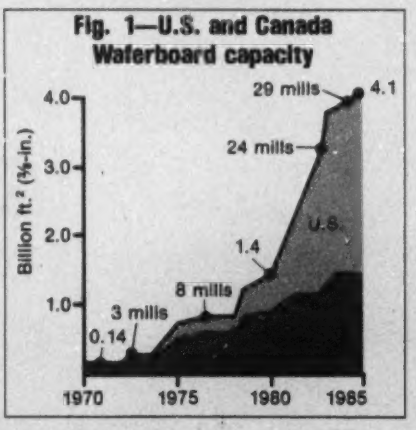


Fig. 1—U.S. and Canada Waferboard capacity

Current penetration of waferboard is in the region of 15%, and it is judged that this could increase to 50% by 1990. This would suggest a consumption level in the region of 2.5 billion ft² of waferboard. A detailed analysis of the specific market regions to be served by each mill—and the competition—would be needed before any truly reliable figure can be developed.

A study of this type was undertaken in Vancouver recently, and it was projected that a penetration level of 25% could develop, given prices about 20% below CSP (Canadian Softwood Plywood). Vancouver, however, is "plywood country."

The situation in Canada is somewhat different. Demand for structural panels is estimated to have peaked in 1976 at over 2 billion ft² but has only dropped marginally since that time. Within this total, waferboard consumption has been rising steadily and had reached 19% by 1981.

It is projected that this could reach 38% by 1990, or just under 1 billion ft².

As in the U.S., important locational aspects must be considered in assessing waferboard penetration. Apart from the Alberta plant, all the waferboard mills are located from Hudson Bay east. Consequently, consumption characteristics for these regions should be isolated from those of Canada as a whole.

In the period 1970-1975, structural panel consumption in the provinces east of Alberta represented an average of 66% of total Canadian consumption. This has been declining steadily and in the second half of the 1970s averaged only 57%.

Waferboard has satisfied a significant portion of this consumption. By 1981 this had reached a level of 30%. As with the U.S., it has been estimated that the level of penetration can reach 50% of consumption. Thus by 1990 waferboard consumption in the area should reach close to 700 million ft² (⅜-in. basis).

Supply/demand balance

To simplify the analysis of supply/demand balance, a somewhat sweeping

Fig. 2—U.S. North East and North Central Waferboard Supply/Demand Balance

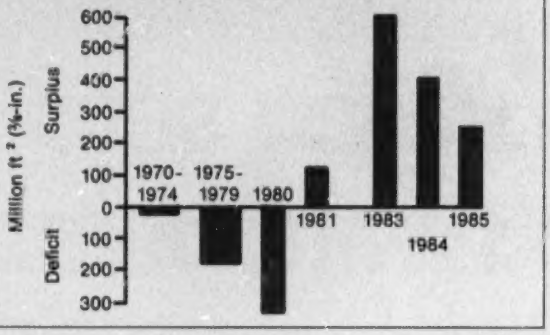
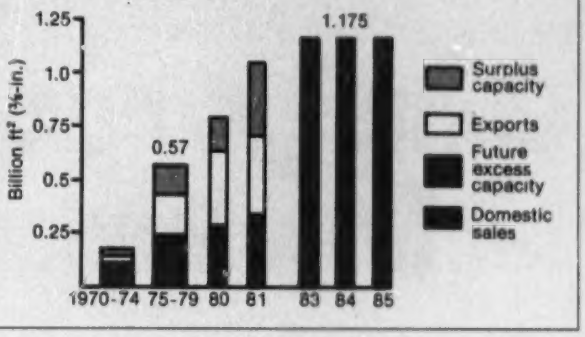


Fig. 3—Canada east of Alberta Waferboard



assumption has been made. It has been assumed that waferboard produced in plants in the U.S. South and West and in Alberta essentially will be consumed in those areas. Thus it will not have a significant impact on the markets where waferboard production exists.

In practice, of course, this does not occur, but it is felt that cross-regional flows in both directions should approximately balance out.

Given this simplification, the situation in the North Central and Northeastern U.S. and in Canada east of Alberta can be analyzed.

The supply/demand balance for the U.S. regions is shown graphically in Fig. 2 for the past 10 years and for the most critical years in the immediate future. In the past, there has been a significant volume of imports from Canada; thus the balance shows a deficit. By 1981, on the basis of the mills completed, there was a small surplus of capacity. In reality, however, there were still large volumes of import since many of the mills did not produce for most of the year, if at all.

By 1983 the mills are all likely to be on stream and there is a very substantial surplus capacity. This is related to the consumption estimates discussed earlier. As waferboard achieves greater penetration in the market, the surplus declines during the subsequent years.

The situation in Canada east of Alberta has been shown in a somewhat different fashion in Fig. 3. Up to 1980 domestic demand plus exports—mainly to the U.S.—produced enough sales to allow mills to operate at 75 to 80% of capacity. In 1981, however, the new capacity that came on stream reduced this operating level to 67% of the capacity in place by the end of the year.

In 1983 and thereafter, there is likely to be substantial waferboard capacity in excess of domestic consumption.

Options available to the Canadian waferboard industry are as follows:

- Export.
- Increase market penetration in existing uses.
- Develop new market sectors.
- Underutilize capacity.

It is worth expanding on each of these options.

Export

It was shown earlier that there is going to be a very considerable amount of new potential production close to the markets to which the Canadian mills have been exported. Competition with this production is likely to be difficult, bearing in mind that:

1.) Canadian waferboard will pay a 7% tariff on entry into the U.S. in 1983.

2.) The average mill will have a transportation disadvantage equivalent to at least $20 per thousand ft².

Clearly, it would be incorrect to assume that no Canadian waferboard can be exported into the U.S., but it appears it is going to be much more difficult and probably less profitable once all the U.S. capacity is on stream.

Overseas export is somewhat limited as an option except to mills reasonably close to the coast. It may be that the European market could develop for significant volumes. That, however, has been a market to which waferboard producers have been trying to sell for a considerable length of time, with only limited success. Other parts of the world, such as the Middle East, are possibilities, but tend not to be major consumers of board products.

Increase market penetration

Developing more sales by increasing penetration in existing uses tends to become more difficult as penetration increases. It is believed that waferboard use in new roof and wall sheathing in the Central Canada region is quite extensive; further penetration of any significance may be difficult. On the other hand, there are a number of consumption sectors where penetration to date is well below potential. Some of these are:

- Flooring. Increased availability of edge-sealed tongue-and-groove flooring would likely improve penetration.
- Greater efforts to produce large panels of suitable strength for the mobile and manufactured home industry should increase business.
- The do-it-yourself market is very large, but waferboard penetration is well below potential. There is significant demand for a weather-resistant thin panel, and the plywood industry tends not to be interested in sheathing grades of much below ⅜-in. A coordinated industry promotion effort, showing how waferboard can be used, would be ideal. Unfortunately, many waferboard producers are also plywood producers, and a conflict of interest exists.

Develop new market sectors

This seems essential if the Canadian waferboard industry is to be viable over the next few years. An increased effort is needed in market and product research. Areas of potential include:

- Development of a suitable overlay so waferboard can compete in the concrete form market. It is believed that MacMillan Bloedel already has succeeded in this. Further overlay development also may permit competition in the industrial market, though price competition from particleboard could make this unrealistic.
- The industrial market, where weather resistance, strength and nonstandard panel size are required, offers opportunities (e.g., container and truck flooring, packaging, and so on).
- Development of one-step panelling systems whereby the waferboard panels are folded to form channel sections for use in walls, floors or roofs.
- Production of treated panels for uses such as all-weather wood foundations.
- Panels for the siding market.

Underutilization

This final option for the Canadian industry is basically unpalatable. But it is inevitable unless serious efforts are made to adopt strategies that will encourage increased markets. ■

THE AUTHOR is a partner at Woodbridge, Reed and Associates Ltd., Vancouver, B.C., consultants in forest industry economics.

The future is rosy for New England's reconstituted wood panel industry. Demand could reach 1.3 billion ft² by the late '80s, and the resource base is plentiful

Continued expansion seen for New England waferboard

By Lloyd C. Irland

Augusta, Maine

In late 1980, Georgia-Pacific Corp. started up the first waferboard mill in New England. That mill represented the beginning of a rapidly growing industry that could reshape forest products utilization in the region.

Today in northern New England, five waferboard or oriented strand board plants are in operation, under construction or have been announced:

- The G-P mill, in Woodland, Maine, has a rated capacity of 166 million ft²/year (⅜-in. basis).
- Elmendorf's oriented strand board plant in Claremont, N.H., is in production, with a capacity of 100 million ft².
- Louisiana-Pacific's waferboard plant in Houlton, Maine, with a capacity of 120 million ft², is currently under construction.
- Diamond International has announced plans for a waferboard plant in Winn, Maine. It will have a capacity of 140 million ft².
- J. M. Huber has announced plans for an OSB plant in Easton, Maine, with a capacity of 130 million ft².

The outlook for this industry in Maine, Vermont and New Hampshire indicates strong potential for expanding output and employment and upgrading wood markets in northern New England (Table 1). What are its growth prospects? Is there an adequate timber resource base? What is required for this industry to reach its full potential? This article briefly examines these questions.

Market growth

Softwood plywood has been the leading structural panel product in the U.S. since the late 1940s (Table 2). Until the mid-1970s, its annual output growth was spectacular, based on its good structural performance, savings of labor cost in installation, good product grading and marketing, and a declining real price. As the housing market peaked in the early 1970s, the real price began to turn upward. A series of changes in timber supply, capital costs, and resin costs began to alter the economics of the industry. During the 1970s, a major shift of production to the South occurred, and in the late 1970s, rail freight rates on wood products rose rapidly, raising delivered prices in the North.

As the plywood market was peaking, the new reconstituted structural products emerged. Based on low wood costs, rapid technological change, and constant capacity additions, the real price of particleboard and related panels continued to fall after plywood began its rise. But growth in the panel production slowed down during the housing doldrums of the late 1970s. Particleboard hardly grew after 1973. MDF grew rapidly in the late 1970s, since it primarily served markets other than housing.

Prices of particleboard were well below those for plywood for the 1968-1980 period, but they have risen relative to plywood in recent years.

The New England market

As the leading panel products slowed down in the face of slow markets, the northeastern waferboard boom began. Why has this region boomed at a time of slow national market growth?

There are several key factors: first, an abundant low-cost wood supply was waiting to be used. As competition for wood rose to unprecedented levels in the West and South, timber and residue prices were bid up rapidly. In contrast, stumpage and delivered prices of pulpwood were stable (at times falling in real terms) in the North.

Second, rising freight costs gave a substantial advantage to serving the northeastern market from local production. Consider this:

In summer 1981, the rail freight rates to Boston were as follows:

West Side, Ore., and Washington fir plywood	$5.60/100 lb
Louisiana southern pine plywood	$3.77/100 lb
Houlton, Maine waferboard	$1.50/100 lb

At 1,541 lb/M for 7/16 in.—a popular thickness—this translates to a $25/M freight cost advantage for Maine waferboard over Louisiana plywood. Southern plywood and particleboard, of course, came into New England from across the South so this figure would be lower for the Southeast.

A third advantage is that the products began to be accepted by builders in the northern market, which began importing from Canada. By the late 1970s, eastern Canada waferboard capacity was on the order of 1 billion ft², and much of that product was being shipped to the U.S.

Potential market, 1985

Conservatively, the northeastern residential sheathing and decking market is 1 billion ft². I estimate that regionally produced reconstituted panels could annex 75% of this market, or 750 million ft². In normal years, a sizable industrial do-it-yourself, mobile home, and nonres-

Table 1—Regional distribution of production Softwood plywood and wood-based panels

Region	Product			
	Softwood plywood, 1980	Particleboard 1979	MDF 1979	Waferboard 1980
Total output	16.5 billion ft²	3.4 billion ft²	507 million ft²	156 million ft²
West	54.7%	46%	41%	0%
South	45.3	49	59	0
North	0	5*	0	100*

Sources: Anderson, 1981, and National Particleboard Assn.
* Author estimate.
Note: Plywood and waferboard figures are given on a ⅜-in. basis. Particleboard and MDF figures are given on a ¾-in. basis.

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idential market would also exist (an estimated 375 million ft², as would an export market (estimated at 200 million ft²).

To achieve a production level in New England that could serve the 1.3 billion ft² potential market, several things will have to happen.

First, mills will have to be carefully sited to fit with local labor markets, transportation constraints, environmental factors, and public attitudes. The full potential implies less than 10 mills of the size recently announced. This should pose little difficulty, since five mills are already sited.

Second, the timber harvesting and wood procurement system will have to be expanded at reasonable cost levels. It also will have to carefully address concerns of some citizen groups and landowners about sloppy wood harvesting. The wood requirement of this industry will be about 1 million cords per year. This is about 10% of current New England production, but is less than the increase that occurred from 1976 to 1980. Should some new development cause a significant increase in delivered wood costs in the region, there would be less likelihood of meeting the identified market potential.

Also, a sizable flow of Canadian wood—probably equal to more than one mill's annual output—now comes into New England. Meeting the ultimate market potential would require displacing these shipments. Even if Canadian producers continue to compete successfully in the regional market, however, a large market potential would remain.

An aggressive selling effort should easily provide for exporting the equivalent of the output of two mills, or 200 million ft², unless logistical or other constraints intertere. It also will be possible for producers to ship large volumes into more distant states. These states have huge local markets and offer a large potential opportunity.

At the same time, however, they are well located relative to Canadian and midwestern production and offer considerable potential for their own waferboard production. Most producers in the New England area expect to be able to ship as far as Baltimore and Cleveland, and some feel they can ship even further.

Finally, serving mobile home, nonresidential and industrial markets will require aggressive selling and a bit of product customizing to provide sizes, thicknesses, and finishes for particular market needs. If these steps are not taken, a large share of the market potential will remain unfulfilled.

The resource base

Assessing the timber resource base for a rapidly growing industry is especially difficult. Available data is old, uses of timber are changing rapidly, and portions of the inventory—notably spruce-fir—are undergoing rapid change due to pests. By 1985, new forest survey data will be available for all of the northern New England states.

The principal elements of the resource base for reconstituted panels in New England will be aspen, budworm-killed or damaged fir, and low-grade hardwood. These will be reviewed in turn.

Table 2—Production of panel products, 1965-80 (million ft²)

Particleboard (⅜-in. basis)	MDF (⅜-in. basis)	Softwood plywood (⅜-in. basis)	(⅜-in. basis)
1965	1,425	—	14,894
1969	1,716	—	13,694
1970	1,764	—	14,340
1971	2,394	—	16,635
1972	3,117	—	16,324
1973	3,494	—	16,304
1974	3,104	—	15,878
1975	2,539	215	16,060
1976	3,292	280	16,400
1977	3,592	441	19,300
1978	3,720	506	19,760
1979	3,376	507	19,683
1980	2,850	485	19,468

Source: Forest Industries magazine, American Plywood Assn., and National Particleboard Assn.

Aspen

In New England, aspen rarely occurs in extensive pure stands as it does in the Great Lakes region and the prairie margins. The bulk of harvestable aspen is in the birch-aspen stands, which cover almost 2 million acres in the three northern New England states. In the aggregate, these stands grow approximately 40 million ft³ of wood each year. They are dramatically underutilized. Regionwide, mortality in the early 1970s exceeded the commercial cut. The net annual growth was six times the cut.

As the high growth-cut ratio indicates, currently there are limited markets for northern New England aspen.

Dead and dying fir

The spruce budworm outbreak of the 1970s and 1980s has already killed millions of cords of fir and some spruce. For the most part, the mortality to date has been widely scattered, a few cords per acre, and in small patches of less than 100 acres. This situation is changing rapidly, however. All around the margins of the spruce-fir region, even larger volumes of mortality are emerging. Deeper into the woods, where spraying continues, patches of mortality will grow. While dead trees can be used for pulp and lumber, the mortality in the 1980s will be in the tens of millions of cords, far exceeding the ability of the lumber and pulp industries to consume. This leaves a vast potential resource with virtually no competing uses.

Substantial testing and experience will be required before we can see the limits on the use of dead fir in New England for making reconstituted panels. Panels from dead fir have been studied in Minnesota. Georgia-Pacific now relies on a certain amount of dead fir.

Low-grade hardwood

Northern New England contains a truly vast resource of low-grade hardwood. There are tens of millions of cords of poor form, low-quality, or less marketable species. Much of this volume would result in improved residual stands if it could be removed.

As large as this resource is, however, there are serious limits on its economic availability. These limits are highly variable from area to area, depending on stocking levels, landownership patterns, logging equipment to be used, and landowner attitudes.

Competing uses of low-grade hardwoods are steadily rising. Markets are growing for hardwood pulp, whole-tree chips for energy, and round firewood. There are no reliable forecasts of future wood energy consumption requirements. During the 1980s, however, a steady increase in the use of low-grade hardwoods seems likely.

Because low-grade northern hardwoods do not seem to be a preferred input for reconstituted boards, there will be an adequate supply of hardwood available for any conceivable level of board industry that may develop in the 1980s. ■

THE AUTHOR is state economist in Maine.

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JANUARY 1983

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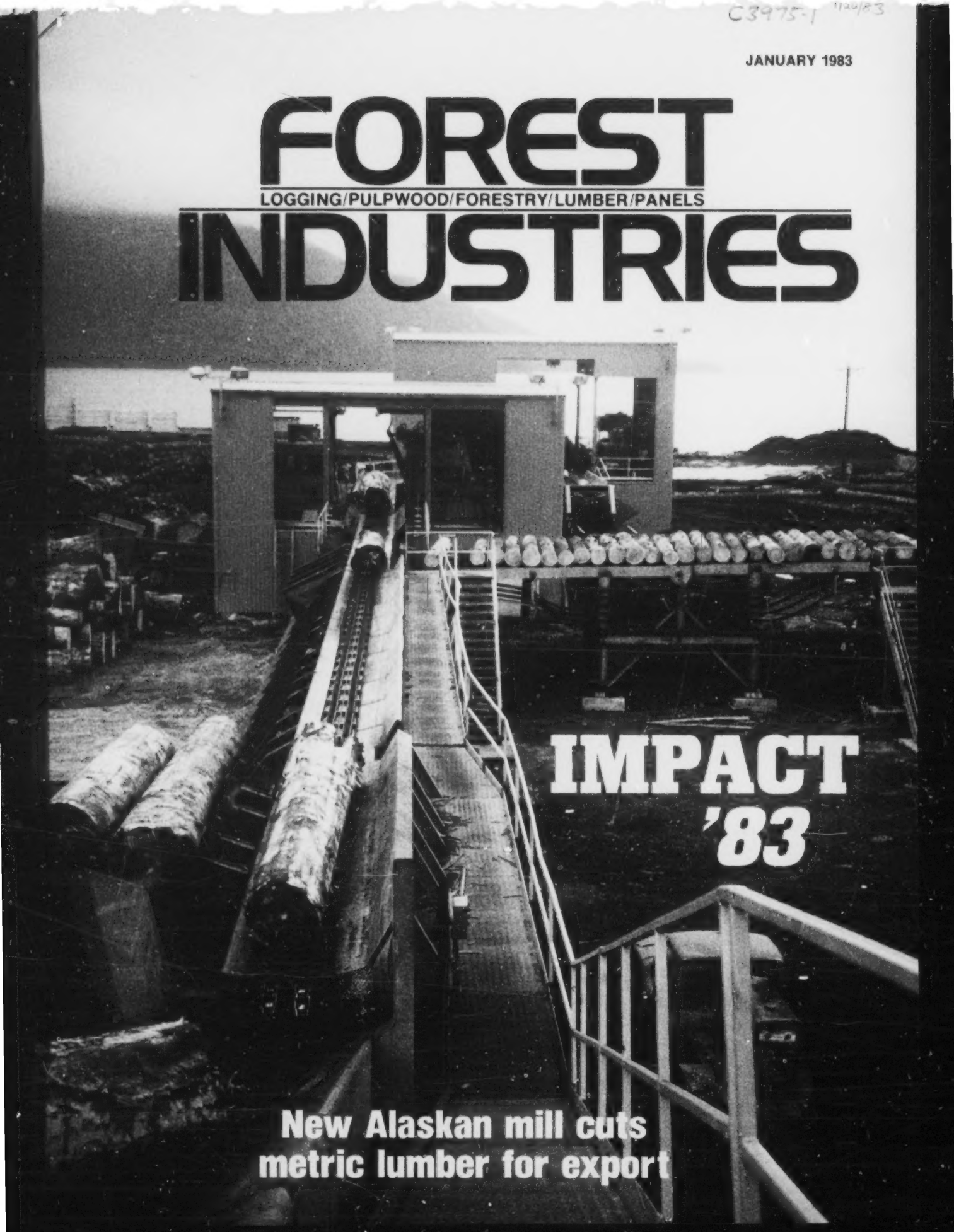

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New Alaskan mill cuts metric lumber for export

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U.S. housing demand has been artificially stimulated by inflation, high interest rates and high marginal taxes—all of which must be eliminated for the economy's sake

Why the housing industry should not recover

By Dwight R. Lee

WHILE THE ECONOMY as a whole has suffered recession, the housing industry has slid into a deep depression. In 1981, housing starts totaled 1,070,000—the lowest number in over 20 years and a drop from 2,019,000 as recently as 1978.

The depressed state of the housing industry today contrasts sharply with the boom in housing experienced during the past decade. For even as economic growth slowed and productivity declined during the 1970s, the residential construction industry enjoyed unprecedented prosperity. Yearly housing starts averaged 1,777,000 during the 1970s, reaching a peak of 2,378,000 in 1972 (Table 1).

The prevailing view is that the housing industry is suffering from record high interest rates and lackluster economic conditions. It is expected that reduced interest rates and increased economic activity will restore the demand for housing and revitalize an industry that is considered important to our economic health.

But this expectation, like so many widespread notions about the economy, is wrong. Lower interest rates will not make housing a more attractive investment. Indeed, one of the major advantages to be realized from lower interest rates is that they will increase the cost of home ownership. Neither will a genuine supply-side economic recovery provide the type of relief hoped for by unemployed construction workers, contractors, and real estate agents. If supply-side economic policy is given time to stimulate real economic growth and productivity, it will do so largely by keeping demand for housing relatively depressed for the next decade or more.

Artificially stimulated demand

The housing boom of the 1970s did not result from a sustainable growth in demand for living space. Instead it was the consequence of market distortions crafted by misguided government policies. Without these distortions, the acceleration in demand for housing would not have materialized. Attempts to restore and maintain the housing demand of the 1970s would require the perpetuation of government-induced distortions that would soon undermine the productivity capacity of the economy upon which all demand ultimately depends.

There is a long history of federal government policies that have artificially stimulated the demand for housing. This history begins with policies that were specifically intended to encourage home ownership and, more recently, has continued with policies that have had the unintended effect of motivating a demand for excessively large houses.

Approximately 50 years ago the federal government began a policy of encouraging the savings and loan industry to make long-term mortgages available at low fixed interest rates to channel more of the nation's savings to home buyers. Significant tax advantages were offered in return for directing funds almost exclusively into mortgages. Regulation was enacted to limit the cost of funds: the Federal Savings and Loan Insurance Corp. was established to insure deposits; the Federal Housing Administration and Veterans Administration were set up to insure mortgages and further subsidize them; the Federal National Mortgage Assn. (Fannie Mae) and the Government National Mortgage Assn. (Ginnie Mae) were created to increase the liquidity of mortgages; and the list goes on.

TABLE 1—Housing starts, 1960-1981

Year	Housing starts
1960	1,296,000
1961	1,365,000
1962	1,492,000
1963	1,642,000
1964	1,561,000
1965	1,510,000
1966	1,196,000
1967	1,322,000
1968	1,546,000
1969	1,500,000
1970	1,467,000
1971	2,048,000
1972	2,378,000
1973	2,054,000
1974	1,351,000
1975	1,173,000
1976	1,550,000
1977	1,989,000
1978	2,019,000
1979	1,745,000
1980	1,291,000
1981	1,070,000

Source: U.S. Bureau of the Census, *Construction Reports.*

Home ownership has been further encouraged by the law that allows taxpayers to deduct mortgage interest payments from taxable income. Although interest payments on business capital are also tax deductible, the effect of interest deductibility is to increase the attractiveness of housing investment relative to business investment. Return on business capital is subject to tax, but there is no tax on the the implicit rental return provided by home ownership. Furthermore, capital gains on owner-occupied housing go virtually untaxed.

These policies were established with the intent of encouraging housing demand and home ownership. While acknowledging that such policies create distortions in the marketplace, some will argue that this is a small price to pay for the social advantages that come from putting home ownership within reach of most Americans. One might accept this argument in an otherwise undistorted economic environment. Unfortunately, when inflation is added to the picture, as it was through the 1970s, the policy bias that directs our savings out of business capital and into residential construction becomes a serious problem.

Tax deductions for interest payments are based on nominal rather than real interest rates (the real interest rate equals the nominal rate minus the inflation rate). As a result, inflation can significantly increase the subsidy received by those buying a house—for it increases both the nominal interest rate and the marginal tax rates paid by home buyers. Inflation has pushed middle-in-

come families into marginal tax brackets that were supposedly reserved for the rich. One needs little more than a modest income, in terms of real purchasing power, in order to be facing a marginal tax rate of 40% or more. In the presence of such a high marginal tax rate, inflation can significantly reduce the after-tax real rate of interest paid on a home mortgage.

An example is helpful here. The real rate of interest is probably around 4%. Therefore, if the inflation rate is zero (and is expected to remain zero), the nominal and real interest rate on a mortgage will be 4%. The home buyer in the 40% marginal tax bracket will then pay an after-tax real rate of 2.4%. But if the inflation rate is 10% (and expected to remain 10%), the nominal interest rate on a new mortgage will be 14%. Now 40% of this much larger nominal rate represents a tax deduction; so the after-tax interest rate is 8.4%. But this is 1.6% less than the rate of inflation; thus, the real interest rate after taxes is *negative* 1.6%. This subsidy to home buyers, which increases with the inflation rate, was a major reason for the housing boom of the 1970s.

To understand fully the relative attractiveness of housing investment in the 1970s, however, one must also recognize that inflation increases the tax burden on business capital in two ways:

1) For purposes of tax accounting, business capital is carried on the books at its historical cost. This means that inflation reduces allowable depreciation expense below real replacement cost and thus overstates taxable profits.

2) The capital gains tax is assessed against increases in the *nominal* value of capital stock, and this nominal increase is always greater than the real increase during inflation.

Those two effects may appear to be offset, at least partially, by the fact that businesses are allowed to deduct nominal interest payments from their taxable profits. But the interest paid by one business generally is received by another business, so the deduction from taxable profit by the former is an addition to taxable profit of the latter.

Economists Martin Feldstein and Lawrence Summers have argued that the two effects offset one another: the effective tax rate on corporate income reduced by nominal interest payments is approximately equal to the effective tax rate on corporate income increased by nominal interest receipts.[1] Therefore, business as a whole receives no advantage from inflation as the result of its ability to deduct nominal interest payments from profits. The net result is that inflation unequivocally reduces the after-tax return on business investment.

TABLE 2—Sizes of newly-constructed residences

Ft^2 of living space for newly-constructed residence

Year	Average	Median
1970	1,510	1,400
1971	1,575	1,415
1972	1,590	1,460
1973	1,660	1,540
1974	1,670	1,565
1975	1,660	1,560
1976	1,710	1,620
1977	1,720	1,630
1978	1,750	1,650
1979	1,760	1,650

Source: U.S. Bureau of the Census, *Construction Reports.*

TABLE 3—Average population per household and family

Year	Per household	Per family (minimum of 2 persons)
1970	3.14	3.58
1971	3.11	3.57
1972	3.06	3.53
1973	3.01	3.48
1974	2.97	3.44
1975	2.94	3.42
1976	2.89	3.39
1977	2.86	3.37
1978	2.81	3.33
1979	2.78	3.31

Source: U.S. Bureau of the Census, *Current Population Reports*, series P-20.

So the inflation of the 1970s, combined with the tax structure, increased the private return on investment in housing and lowered the private return on investment in productive capital. The result of these distorted incentives was predictable. Housing investment increased relative to business investment.

During the last half of the 1960s, the ratios of net investment in residential capital to net investment in plant and equipment was 52%. In the last half of the 1970s, the ratio has increased to 76%.[2] This shift can be explained in part by the maturation of the post-World War II baby boom and the increase in family formation that resulted during the 1970s. But this is only part of the explanation. The average size of new houses, measured in square feet, increased every year during the 1970s, with the exception of the recession year 1975. The average new house had 1,510 ft^2 in 1970 and 1,760 ft^2 in 1979—an increase of over 16% (Table 2).

The persistent increase in housing size is explained entirely by the distorting effects of inflation and taxation. In the absence of these distortions, the size of newly-constructed housing would have declined during the 1970s. Real family incomes after taxes fell during the decade. After correcting for inflation and the impact of federal taxes, the median family income declined from $8,412 in 1970 to $7,976 in 1980.[3] Also, household size (i.e., the number of family members) was declining throughout the 1970s (Table 3).

Rather than directing the nation's savings into much-needed productive capital, we were putting investment funds into larger homes housing smaller families.

One of the more harmful consequences of this misallocation of savings (savings that have been unfortunately depressed because of the penalty that inflation has imposed on savers) has been the stagnating productivity that characterized the U.S. economy during the 1970s. From 1973-79 the economy experienced the lowest annual increase in labor productivity of any major industrial economy in the free world (Table 4). It is no accident that the boom in the housing industry coincided with languishing economic productivity.

The supply-side solution

The route to economic growth and prosperity is through investment in productive capital, not through the construction of oversized houses to take advantage of a tax dodge. The objective of supply-side economic policy is to moti-

TABLE 4—Labor productivity increase, 1973-1979

Country	Annual increase, %
U.S.	0.1
Japan	3.4
Germany	3.2
France	2.7
U.K.	0.3
Italy	1.6
Canada	0.4

Source: Economic Report of the President, January 1980, p. 85.

vate the type of investment necessary for a genuine resurgence in productivity by increasing the return on business capital relative to the return on consumption expenditures. The uncontestable premise of supply-side economics is that people respond to changes in relative prices.

Arguing fron this premise, supply-side economists advocate a reduction in marginal tax rates on personal and business income. By increasing the price of leisure and consumption relative to the price of saving and production, such tax cuts will, in their view, have a direct impact on the productivity of the economy by motivating more investment in both human and nonhuman capital.

Indirectly, the tax reductions will also exert a moderating influence on inflation by increasing the quantity of goods and services relative to the money supply. Complementing marginal tax reductions is a monetary policy designed to reduce inflation directly by bringing monetary growth under control and restoring the public's shaken confidence in the value of the dollar. To the extent that this supply-side program is given time to succeed, the appeal of housing as an investment will be greatly diminished.

The short-run influence of tax cuts and tight money on housing demand is clear. In the absence of fully offsetting cuts on government spending, tax cuts will, in the short run, increase the federal deficit.[6] If the commitment to restricted monetary growth is maintained, the bulk of the deficit will have to be financed with increased government borrowing, and this will mean increased demand for loanable funds and may *possibly* result in higher real interest rates.[7] This short-run, or transitional, impact of supply-side economic policy goes a long way toward explaining the current depression (not recession) in the residential housing industry.

In the longer run, a consistent application of supply-side policy will reduce the squeeze on financial markets and bring a decline in both real and nominal interest rates. Given time, restored incentives for capital formation will generate a larger tax base and increased tax revenues that in turn will reduce the deficit—assuming that growth in government expenditures is controlled.[8] A small deficit (preferably none at all) will greatly reduce the government's demand for loanable funds and ease any upward pressure on real interest rates.

The tight money policy that many mistakenly see as the reason for high current interest rates will, if continued, reduce nominal interest rates by reducing inflation. Indeed, unless inflation is controlled, high inflationary expectations will continue to be reflected in the high inflation premium that now makes up the largest component of the nominal interest rate. Reducing inflation is a slow process, but unfortunately, because of our recent history of inflation, it will take even longer to reduce inflationary expectations. Even if the Federal Reserve Board stays with a tight money policy and the fight against inflation is ultimately successful, it will be a long time before expectations fully adjust to this success. The decline in the nominal interest rate will then lag behind the decline in the real interest rate, which means higher real interest rates during the transition from higher to lower inflation.[9]

Thus, the short-term effect of a successful supply-side policy will be to create an economic climate that discourages entering into the long-term fixed financial commitments that have so greatly facilitated housing demand in the past. But even long after we have made the transition required by a successful supply-side policy, there will be little relief for the housing industry. A long-term supply-side economic policy will eventually produce an economic environment of stable prices, low nominal interest rates, lower marginal tax rates on personal and business income and expanding business investment. These conditions will insure that housing demand will not soon rebound to the boom levels experienced during the 1970s.

Reduced inflation will increase the interest cost of a mortgage because the tax write-off on the interest payment declines as nominal interest rates fall with inflation. To the extent that genuine income tax reductions put people in lower marginal tax brackets, the after-tax interest payments will be further increased. With faster depreciation write-offs on business capital, along with lower corporate profit and capital gain taxes, investment in business capital will become increasingly attractive relative to investment in housing space. This relative attractiveness of business investment will be further increased as a lower inflation rate moderates the exaggeration of corporate profits and reduces corporate tax liability.

There are those who point to the depressed housing industry as evidence that current economic policy is not working. In fact, the movement of labor and materials out of residential construction is necessary if prosperity is to be restored. This adjustment should be viewed as releasing important resources for use in more productive activities. In fact, when it becomes apparent that a lower percentage of our savings is flowing into business capital, we will have strong evidence that supply-side economic policy is working as it should.

This is not to deny that the housing industry is important to our economy. But not even the housing industry could long benefit from a continuation of past policies—policies that subsidized housing demand at the expense of the economic productivity that ultimately determines the health of all industries. ■

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1. See Martin Feldstein and Lawrence Summers, "Inflation and the taxation of capital income in the corporate sector," *National Tax Journal* (1980): 447-70.
2. See Martin Feldstein, "Inflation, tax rules and the accumulation of residential and non-residential capital," NBER Working Paper (September 1981), No. 753.
3. These figures were cited in James T. Bennett and Thomas J. DiLorenzo, "How the government evades taxes," *Policy Review* (Winter 1982): 71-89. The figures understate the actual decline in real after-tax income because they do not include state and local taxes, taxes that increased more rapidly than inflation during the 1970s.
4. Economic Report of the President (January 1981), p. 290.
5. Ibid. p. 289.
6. More accurately, if the growth in government spending is not reduced as much as the growth in taxes, the immediate effect will be to increase the federal deficit.
7. "Possibly" is emphasized, since the tax cut on personal incomes will result in some increased savings, and the cut in corporate profit taxes will allow for more internal financing. Both of these responses to tax cuts take pressure off the market for loanable funds.
8. A tax cut will not result in a complete, and certainly not in a quick, investment response unless investors have reason to believe the cut will not be soon rescinded through either inflation or overt policy. This provides the rationale for the Reagan Administration's insistence that Congress commit itself to a multi-year tax cut. But when the credibility of this commitment is undermined by politicians calling for rescinding the tax cut even before it becomes effective, there can be little hope for more than a timid and delayed supply-side response. For a discussion of this point, see James M. Buchanan and Dwight R. Lee, "Time, Politics, and the Laffer Curve," *Journal of Political Economy*, forthcoming.
9. Look at the other side of this coin: we experienced inflation for well over a decade before it was fully reflected in the nominal rate of interest on long-term loans. As inflation escalated during the 1970s, the inflation premium lagged the inflation rate. As a consequence, real interest rates on mortgages were low, and in many cases negative, during the 1970s. Note that here we are talking about very low to negative real interest rates before taxes, which translated into decisively negative after-tax interest rates.

Annual survey figure represents an index slightly off last year's pace when projects scheduled for completion in 1982 are included, but what lies ahead looks grim

Economy causes sharp capital spending drop

Atlanta, Georgia

PROLONGED poor business conditions within the forest products industry have stalled capital improvement projects previously announced and have put the brakes on the announcement of new mill and plant remodeling plans, in reaction to shrinking revenues and comatose markets. As a result, our annual informal survey of capital projects completed in the past year and scheduled for completion this year and in the near future has been approached with fingers crossed.

Our main concern lies with projects announced, then cancelled or postponed indefinitely without fanfare. We hear about the former but not always about the latter. With that disclaimer registered, let's look at the figures, all expressed in U.S. dollars:

Stopping the clock in December, we come up with 61 capital projects in North America valued at an estimated $921 million, an average of $15.1 million apiece. Over half that volume, $533 million, is represented by projects completed in 1982, however, leaving relatively small pickings on the table for 1983 ($59 million), 1984 ($58 million) and future ($270 million) completion. The "future" category includes projects specified for completion beyond 1984 as well as those for which no completion date was indicated.

As a point of comparison, the survey published in our January 1982 issue listed 80 projects worth $1.215 billion completed the year before or in the works. Previous surveys appeared in our January 1979 (54 projects, $615.5 million) and January 1980 (91 projects, $1.018 billion).

As we've noted before, the overlapping time periods involved make it impossible to add the figures together to produce an accurate capital expenditure total for more than one survey period. That considered, the totals represent more of an index of activity than a basis for cumulative record-keeping.

Regional totals as listed in the tables put the northern states and eastern Canada ahead at $270 million, followed by western Canada at $219 million, the western U.S. at $179 million, South Atlantic states at $161 million and South Central U.S. at $91 million.

In last year's survey the rankings were northern U.S. and eastern Canada, $361 million; western U.S., $343 million; South Atlantic, $228 million; western Canada, $164 million; and South Central, $119 million.

Massaging this year's figures, we find that eastern and western Canada together total $290 million, leaving the U.S. with a $631 million share of our estimated total. U.S. projects east of the Great Plains amount to $451 million, of which $199 million worth are in the Lake States and New England and the remaining $252 million worth are projects in Dixie.

Applying the same yardstick to last year's figures, for comparison: Canada, $229 million; U.S., $986 million; east of Great Plains, $643 million; Lake States

COMPANY AND LOCATION	TYPE OF PLANT	COMPLETION
WESTERN U.S. (TOTAL VALUE: $179 MILLION)		
Burlington Northern Corp. (& Colville Confederated Tribes), Ferry County, Wash.	Sawmill	Future†
Champion International Corp., Roseburg, Ore.	Plywood*	1983†
Crown Zellerbach Corp., Omak, Wash.	Plywood*	Future†
Crown Zellerbach Corp., Portland, Ore.	Log processing	Future
Dant & Russell Inc., Warrenton, Ore.	Sawmill*	1982
Frontier Fiber Inc. (& Meadows Resources Inc.), Las Vegas, N.M.	MDF, sawmill	1984
International Paper Co., Gardiner, Ore.	Sawmill*	1982
Layman Lumber Co., Natches, Wash.	Sawmill*	1982†
North Side Lumber Co., Philomath, Ore.	Sawmill	1982†
Pope & Talbot Inc., Spearfish, S.D.	Sawmill	1982†
Seaboard Lumber Co., Seattle, Wash.	Sawmill	1982
Stimson Lumber Co., Forest Grove, Ore.	Sawmill	1982
Trus-Joist Corp., Eugene, Ore.	Lam. veneer lbr.	1982†
WESTERN CANADA (TOTAL VALUE: US$219 MILLION)		
B.C. Forest Products Ltd., Knight, Alta.	Sawmill	1982†
BC Timber Ltd., Castlegar, B.C.	Sawmill*	Future
BC Timber Ltd., Nelson, B.C.	Sawmill*	Future
BC Timber Ltd., Terrace, B.C. (2 mills)	Sawmill*	1987
BC Timber Ltd., Kitwanga, B.C.	Sawmill*	1987
BC Timber Ltd., Hazleton, B.C.	Sawmill*	1987
Canadian Forest Products, New Westminster, B.C.	Hardboard*	Future
Crown Zellerbach Canada Ltd., Coquitlam, B.C.	Sawmill	1983†
Northwoods Mills Ltd. (& Alco Ltd.), Rocky Mountain House, Alta.	Sawmill, waferboard	Future
Pelican Spruce Mills Ltd., Edson, Alta.	"Panel board"	1984
Simpson Timber Co. Ltd., Blue Ridge, Alta.	Finger joint	1982†
Trus-Joist Corp., Claresholm, Alta.	Lam. veneer lbr.	Future†
Weldwood of Canada Ltd., 100 Mile House, B.C.	Sawmill	1982†

* Expansion or modernization
† Carried forward from previous list without verification

and New England, $296 million; southern U.S., $347 million.

Lumber production facilities, new and remodeled, accounted for the biggest product share of the total, at $431 million. Reconstituted wood panels, mostly waferboard and OSB in the northern states and eastern Canada, rang up a total of $349 million. Plywood at $83 million was the other major product category.

When you take away the projects indicated for completion in 1982, the relation between the figures remains the same although the margin of difference changes. Lumber at $180 million is ahead of reconstituted panels, again mostly waferboard and OSB, at $154 million. Plywood's total is $29 million.

The most sobering aspect of the current figures is not the slight decline from last January's survey totals, but the sharp drop in projects scheduled for completion after 1982. This squares with observations that the economic disaster visited upon the forest products industry by high interest rates has virtually shut off the flow of capital spending.

In terms of net new capital expansion in solid wood, "for next year we see nothing," observed Johann Veltkamp, group vice president, forest resources, for Data Resources Inc., a private forecasting concern based in Lexington, Mass.

"There may be some expansions in reconstituted panels—waferboard and OSB—and maybe some attempts at modernizing mills," Veltkamp added. With western timber prices low, the economic pressure to improve product recovery has been reduced, he noted, although improvements that can offer a good payback in terms of labor costs and productivity will remain attractive.

"It won't stay that way, though," Veltkamp cautioned, predicting that stumpage prices in the West will increase again. Mill modernization programs to improve recovery will become apparent in 1984 and 1985, he said.

Reflecting only individual projects announced, the totals on these pages do not include broad but unspecific capital programs under way. As noted in May, major corporations had these amounts allocated for capital spending in 1982: Weyerhaeuser Co., $500 million; Boise Cascade Corp., $250 million; Georgia-Pacific Corp., $225 million; and Potlatch Corp., $89 million. In all cases but one, figures were down substantially from the year before, and all involve considerable investment in the pulp and paper side of company operations.

Weyerhaeuser, it was noted, has shifted emphasis from large investments in new plants to several hundred small modernization projects aimed at improving productivity and energy efficiency and designed for prompt payback. And Georgia-Pacific's curtailed spending program was described as "just maintenance."

Boise Cascade scheduled slightly more spending for 1982 than for 1981, but each of those years represented just over half the spending level recorded in 1980.

As with our previous informal surveys, the major source of information for the material on these pages is the back issue file of this magazine: announcements in the *For the Record* department and feature stories describing new mills. The tables indicate by a footnoted symbol the projects carried forward from last year's list without verification, versus projects newly announced during 1982 or subject to a progress report during the year. ■

COMPANY AND LOCATION	TYPE OF PLANT	COMPLETION
NORTH, NORTHEAST U.S.; E. CANADA (TOTAL VALUE: US$270 MILLION)		
Blandin Wood Products, Grand Rapids, Minn.	Waferboard*	1982†
Consolidated-Bathurst Ltd., St. Fulguence, Que.	Sawmill*	1982†
Forex-Leroy Inc., Val d'Or, Que.	Waferboard	Future
Grant Lumber Ltd., Englehart, Ont.	Waferboard	1982†
Great Lakes Forest Products Ltd., Dryden, Ont.	Stud mill	Future†
Hedstrom Lumber Co., Grand Marais, Minn.	Sawmill	1982
J.M. Huber Corp., Easton, Me.	Waferboard	Future
Les Matériaux Blanchet, Saint-Pamphile, Que.	Sawmill	Future†
Louisiana-Pacific Corp., Hayward, Wis.	Waferboard*	1982†
Louisiana-Pacific Corp., Houlton, Me.	Waferboard	1982†
Potlatch Corp., Cook, Minn.	OSB	1982†
Waferboard Corp., Timmins, Ont.	Thinboard	1982†
Weyerhaeuser Co., Grayling, Mich.	OSB	1982
SOUTH ATLANTIC U.S. (TOTAL VALUE: $161 MILLION)		
Boise Cascade Corp., Chester, S.C.	Plywood, sawmill	1982
Brunswick Pulp & Paper Co., Sterling, Ga.	Sawmill	1982
Buckeye Cellulose Corp., Barnesville, Ga.	Sawmill	1982†
Chesapeake Corp. of America, Princess Anne, Va.	Sawmill	1982†
Chesapeake Plywood Corp., Pocomoke City, Md.	Plywood*	1982†
Columbia-Carolina Corp., Marion, N.C.	Hardwood plywood	1983
Federal Paper Board Co., Anson County, N.C.	Hardwood sawmill	Future
Federal Paper Board Co., Lilesville, N.C.	Plywood	1982†
Georgia-Pacific Corp., Ellabell, Ga.	Sawmill	1982
Hammermill Paper Co., Tuscaloosa, Ala.	Sawmill	1982
Holly Hill Forest Inc., Holly Hill, S.C.	Treating	1982†
New South Forest Industries, Camden, S.C.	Sawmill	1982†
Scotch Plywood Inc., Beatrice, Ala.	Plywood*	1982
Trus-Joist Corp., Valdosta, Ga.	Wood trusses*	1983
SOUTH CENTRAL U.S. (TOTAL VALUE: $91 MILLION)		
International Paper Co., Coushatta, La.	Sawmill*	1982†
International Paper Co., Durant, Miss.	Hardwood sawmill	Future†
International Paper Co., Kosciusko, Miss.	Sawmill	Future†
International Paper Co., Noble, La.	Sawmill	Future†
Manville Forest Products Corp., Huttig, Ark.	Sawmill*	1983†
Masonite Corp., Thibodaux, La.	Hardwood sawmill	1982
Temple-Eastex Inc., Pineland, Tex.	Log processing	1982
Willamette Industries Inc., Malvern, Ark.	MDF*Sawmill	Future

* Expansion or modernization
† Carried forward from previous list without verification

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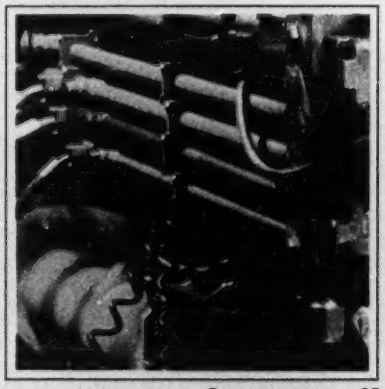

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1983 PANEL REVIEW

Panel production declined in 1982, but at year's end and into early 1983 the signs of recovery were evident, with output, prices and operating rates moving sharply upward

Housing market finally smiles on panel makers

Atlanta, Georgia

By David A. Pease

When the market goes to hell, there isn't hardly a thing anyone can do about it. Likewise, when recovery occurs, it seems nothing can hold it back. If any segment of the forest products industry can claim results from the aggressive steps it has taken to diversify markets, thus minimizing the effect of the demon housing whiplash, it is the panel industry.

Yet as goes housing, so goes the wood industry, and panel producers are not exempt from its influence. That was bad news last year. Now it is good news, as a shaky confidence in reduced interest rates has brought housing starts out of the cellar and, with them, improved demand, prices and production levels for building products.

Production levels in all panel categories were lower in 1982 than they were the year before—many years before, as a matter of fact—as Table 1 indicates.

The exception is waferboard, but that is a category within a category, thanks to the adoption of performance standards that blur the demarcation line between softwood plywood and non-veneer products sharing the same end use. The industry now classifies that lot as structural panels.

Structural panels

At an estimated 16,988,516,000 ft² (⅜-in. basis) last year, the U.S. production level for structural panels nudged between figures inked in for 1981 and 1980, a shade beneath the former and a little better than the latter, but you have to turn the pages back to 1975 to find another year worse than last year.

What's in store for 1983? The latest from the American Plywood Assn. is 18 billion ft². This is a nudge upward from a December APA forecast of 17.9 billion ft² and is based on an estimate for 1983 of 1.3 million housing starts.

Robert G. Anderson, director of market research and economic services, acknowledged the housing projection as conservative among estimates from various sources ranging to 1.6 million, but said he took the low road because housing recovery will be held back by (1) costly mortgages and (2) changes in the home financing structure—new mortgage instruments and non-traditional mortgage agencies—yet to be defined with precision.

This is not all bad. Anderson termed a slow economic recovery coupled with relatively stable interest rates "exactly the right mix for a gradual housing recovery" that will follow tradition in leading the economy out of recession. "Just don't expect too much of it," he cautioned.

But which is the tail and which is the dog? Housing represents the biggest market for structural panels, to be sure, but it's a plurality, not a majority. Anderson pointed out that 70% of last year's demand was represented by non-housing markets, a proportion that will drop to 64% as residential construction regains lost ground in 1983.

Table 2 lists the major market segments and volumes that make up the estimated 18 million ft² demand that will be shared by U.S. softwood plywood/structural panel producers. Beyond housing, here are Anderson's remarks on each:

• Home repair and remodeling—"Last year remodeling dropped off a bit as the economy declined and the unem-

TABLE 1—Panel Production—1972-1982
(sq ft)

Year	Particleboard ¾-in. basis	Hardboard ⅛-in. basis	MDF ¾-in. basis	Softwood plywood ⅜-in. basis	Hardwood plywood surface measure
1972	3,116,944,000	5,798,376,000	—	18,323,754,000	2,223,182,000
1973	3,493,648,000	6,475,387,000	—	18,304,599,000	2,048,362,000
1974	3,103,800,000	6,056,542,000	—	15,878,380,000	1,644,043,000
1975	2,538,934,000	6,237,906,000	215,496,000	16,050,180,000	1,279,592,000
1976	3,202,200,000	7,066,022,000	280,036,000	18,400,000,000	1,463,135,000
1977	3,592,210,000	7,200,000,000	441,354,000	19,300,000,000	1,478,000,000
1978	3,610,000,000	7,800,000,000	480,000,000	19,760,000,000	1,480,571,000
1979	3,300,000,000	7,687,798,000	490,000,000	19,750,000,000	1,434,521,000
1980	3,029,000,000	6,140,000,000	513,000,000	16,468,000,000	1,312,000,000
1981	2,930,000,000	6,104,000,000	530,000,000	17,022,899,000	1,270,220,000
1982	2,400,000,000	5,586,918,000	460,000,000	16,988,516,000	Not reported

TABLE 2—Estimated structural panel demand by market, 1983
(million ft², 3/8-in. basis)

Market category	Est. demand	Change from '82
Housing	6,400	+25%
Home repair & remodeling	5,400	+ 2%
Industrial	2,850	+ 4%
Non-residential construction	2,700	− 2%
International	650	+30%
Total:	**18,000**	

Source: American Plywood Assn.

ployed became fearful of getting back to work. This year I expect an unemployment peak and a gradual return to work. This will help get us back to a more normal growth in this homeowner use."

• Industrial—"This segment will be buoyed up by military expenditures, a resurgence in truck building and a strong growth in materials handling devices. Although furniture will show a modest recovery, this will benefit the hardwood and particleboard people a bit more than the plywood industry."

• Non-residential construction—"Fewer buildings will be built, and only a modest increase in productive capacity is planned. The non-building sector will feature road and bridge repair, an area not particularly wood-product intensive. It should help the concrete form producers most."

• Exports—"One of my favorite opportunity markets. Many facets of offshore markets make them exciting and profitable, yet they are frustrating and slow to develop. We have been working in Europe for 20 years now, and are just beginning to get a foothold. Japan is worse, but we are at least talking now. South America is the farthest from strong development although we'll get a million feet here and a million feet there. Most export problems lie in artificial constraints through code and tariff barriers. We are getting these resolved, and I anticipate offshore shipments will exceed 1 billion ft² before the turn of the century."

The association's promotion program in 1983—APA's 50th anniversary year—will continue to focus on the five major market categories, observed executive vice president Bronson J. Lewis.

The structural panel umbrella in the U.S. covered 184 plants operating at the beginning of this year—171 plywood, four waferboard, four oriented strand board (OSB), two plywood and composite, and two composite. Industry capacity stood at 24,412,180,000 ft².

On an average last year, the structural panel industry operated at a low 70% of capacity, down from 75.6 in 1981—itself not a good year. But as with the man who drowned in a lake averaging 4 ft in depth, this does not tell the story with precision.

The graph on p 24 traces the operating percentage of capacity which started 1982 under the 60% mark and, except for holiday shutdown periods, rose steadily.

The figure topped 80% for the first time in 1982 during the last week in August and, again excluding holidays, stayed above 80% most of the rest of the year and remained in the low 80s after the normal Christmas-New Year slump.

At mid-February of this year, according to the APA, 37 of the 184 U.S. structural panel plants were closed and another 37 were curtailed, with the industry operating at 83% of capacity. In the comparable week during 1982, 53 panel plants were closed and 59 were curtailed out of a total of 185 plants, and the operating rate was 62% of total capacity.

Employment statistics follow the same track: 10,371 workers laid off, representing 27% of the work force, at the mid-February point in 1982, improving to 6,358 workers off the job, or 17% of the total, in mid-February 1983.

Prices gyrated somewhat during 1982, but an upward trend is visible on the graph. Figures are the composite price for softwood plywood calculated by, and reported in, the weekly newsletter *Random Lengths*. The composite figure has remained above $190 per thousand since May, dodged back and forth across the $200 line through the balance of the year, and has remained above $210—indeed above $220 most of the time—since the beginning of 1983. There is no need to explain the obvious relationship between stronger markets and increased production.

National Forest Products Assn. reports a softwood plywood price index for January 1983 of 295.0, based on a 1967 baseline of 100.0. This is a 2.4% improvement over the December 1982 index and a 4.4% gain in comparison with the January 1982 index.

Virtually all softwood plywood manufactured in Canada comes from plants in British Columbia and is sold primarily in the Canadian market, where per capita consumption is higher than in any other country. (Indeed, North America as a whole consumes 90% of the world's softwood plywood.) In an average year, about 20% of B.C. production is exported, most of it to the European Economic Community. Tariffs imposed by Canada and the United States have made it uncompetitive for B.C. producers to market in the U.S., thus production is influenced sharply by Canadian housing starts.

Softwood plywood production in B.C. reached a high point of 2.55 billion ft² (⅜-in. basis) in 1978, and has since moved steadily downward.

The Council of Forest Industries of B.C. has estimated 1982 production at 1.385 billion ft², a level 46% below the 1978 high-water mark. Shipments in 1981 totaled 1,953,300,000 ft², of which 1,542,500,000 ft² went to Canadian destinations, 380,900,000 ft² went to EEC countries and 29,900,000 ft² went to other export destinations. (In 1981, Canada also imported 149,338,000 ft² of softwood plywood.)

The market for B.C. softwood plywood weakened dramatically during the first half of 1982 as the full effects of economic recession came to bear on the Canadian housing industry, reflecting the lowest ebb in housing construction activity in more than a decade. Canadian housing starts in 1982 were estimated at 130,000, down almost 50% from a peak of 273,000 attained in 1976. Canada did not enjoy a housing surge in the 1977-79 period comparable to that experienced in the U.S.

Hardwood plywood

Production figures for 1982 were not available in time for this review. U.S. manufacturers in 1981 produced 1,270,220,000 ft² (surface measure) and shipped 1,108,786,000 ft², reflecting steady slippage since 1977, when those figures were 1,499,242,000 ft² and 1,366,629,999 ft² respectively.

Imports are a major factor in hardwood plywood consumption in this country, although the ratio of imports to total consumption has declined every year since 1976 to 65% in 1981. Exports represent a small volume in comparison with imports, but increased in 1981 to 55,005,000 ft² after a three-year slump. Most exports go to Canada and Mexico.

Hardwood plywood prices declined during 1982. NFPA indicated a January 1982 index of 175.0 (against a 1967 base of 100.0), the same as December 1982 and 5.1% below January 1982. This was the only wood products category showing a drop in the index over the year's time.

Activities of the Hardwood Plywood Manufacturers Assn. during 1982 in-

cluded development of an American National Standard for Laminated Hardwood Flooring, approved in September by the American National Standards Institute.

The standard, ANSI/HPMA LHF 1982, specifies requirements for grading, moisture content, construction and finish, and supercedes two other flooring standards: ANSI 010.2-1975 for laminated hardwood block flooring and ANSI/HPMA-LFT-1978 for laminated hardwood floor tile.

Formaldehyde problems

HPMA has joined with other panel producer groups in developing scientific data pertaining to formaldehyde emissions, and in October 1982 introduced to its members at the HPMA annual meeting in Boston a small-scale test method for determining formaldehyde emissions from wood products. This two-hour desiccator test was developed jointly by HPMA, the National Particleboard Assn. and the Formaldehyde Institute. HPMA has also developed a large chamber test that is used to simulate the ambient air conditions in a mobile home.

The persistent issue of formaldehyde emissions from panels formed with urea formaldehyde resins has brought forth regulatory threats at state and federal levels, including motion by the U.S. Department of Housing and Urban Development toward incorporation of formaldehyde emission limitations in the Federal Manufactured Housing Construction and Safety Standards. Minne-

Plywood manufacturing is more precise, thanks to computers

Atlanta, Georgia

In case you haven't noticed, panel manufacturing technology is square in the middle of the electronics age.

Microprocessors and programmable logic controllers capable of reliable operation in a plant environment are contributing measurable gains to production, operating efficiency and product recovery. They are also contributing to increased capital costs, but a handsome return on investment provides the accounting logic and reduced production costs per volume can make the difference between profit and loss for a plant.

There is more to high-tech panel making than electronics, to be sure. But the mechanical elements of new production technology are inescapably linked to the new generation of electronic control systems.

The plywood segment of the industry provides the most visible concentration of developments in this category, probably because particleboard *et al* has always involved a more sophisticated manufacturing process. Plywood—particularly softwood plywood, with the high volumes involved—also has offered the greater potential for gain, from the standpoint of improving efficiency and recovery in the process of converting dimensionally-erratic round logs into flat, dimensionally-stable products with predictable strength values.

One can see the new technology almost anywhere in a plywood plant, but areas that have received prime-time attention recently deal with veneer peeling and drying, other concepts such as mechanized layup having gained maturity. The key word is *recovery.*

Once peeler blocks have been softened in hot water (times and temperatures calculated by computer, of course) to enhance their peelability, the challenge is to recover the maximum volume *and* value in veneer. Enter the X-Y lathe charger, popular in new installations and as a retrofit item since its debut in 1977.

Where the previous generation of lathe chargers enabled the operator to center the block against a shadowline bull's-eye and obtain an eyeball estimate of the best position, scanners (optical or ultrasonic) and computers have taken over.

Most manufacturers have chosen the optical route. Coe's Model 777 takes one second to rotate and scan the block at 120 points around its circumference and length to determine the position of the largest solid wood cylinder attainable, and adjusts the axis automatically. Durand, Premier Gear and Applied Theory advertise similar X-Y chargers (horizontal lines on the grid used to plot the position are called X lines and verticals are Y lines in computerese). Manufacturers attribute a recovery increase of 5% to 10%, plus 10 to 15% additional full-sheet production, to this device.

Black Clawson uses ultrasonic sensing to scan the block for positioning. Five sets of four scanners, three above and two below, beam ultrasound, and a computer calculates block profile from the reflected echo and commands the positioning setworks. A West Coast installation (see pp 28-29) has produced a 7% recovery increase; another installation was described in our December 1982 issue (pp 16-17).

There is other peeling hardware to consider. Powered backup rolls as offered by Coe, Premier and Durand increase recovery by reducing spinouts and core flex, with recovery increases to 5% claimed. Minimum core diameters of 3½ in. are possible.

Other approaches include Applied Theory's digital backup roll control which positions the roll .002 to .004 in. from the block to control flex and relieve pressure variations, and Meinan's circumferential block drive which has seen application in the Far East.

Another contribution to peeling speed and accuracy is the digital hydraulic knife carriage. Durand claims a recovery improvement of up to 2% and a reduction in non-productive time between blocks. Applied Theory and Premier note that fast retraction eliminates collisions between the knife and inner spindle. A selection of core sizes can be preset.

With PLC-controlled digital drive and follower systems speeding veneer away from the lathe, emphasis has been placed on rapid clipping and downstream handling. Electronic scanner controls for clippers are par for the course now, and the new object of attention is Durand's rotary clipper, which feeding high-speed veneer stackers can increase production up to 40%, says the manufacturer.

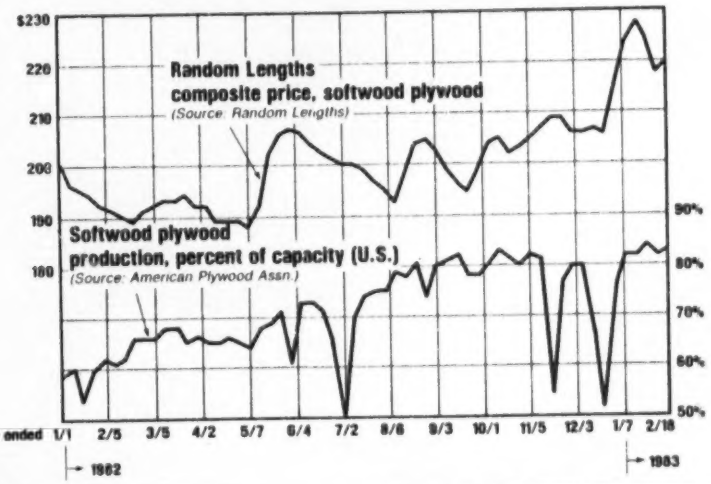
(For a look inside a southern pine plant containing a wonderland of off-the-shelf goodies including X-Y chargers, powered backup rolls and rotary clippers, turn to this month's cover story, pp 25-27).

Veneer drying technology has taken off in a couple of directions. Conventional dryer manufacturers such as Coe and Moore International have steadily improved the efficiency of their products, and computers linked with sophisticated moisture detectors in systems provided by suppliers such as Ward and Wagner can target upon a preselected redry percentage and either provide an operator with the information needed to adjust dryer controls or signal PLCs directly to achieve the adjustments automatically.

New drying concepts include Raute's roller dryer, which optimizes energy consumption and drying capacity through microprocessor control, and the unusual Drying Systems Inc. wicket dryer which conveys veneer sheets on edge.

There's more, of course, and this purports to be no more than a sampler. Technoids never sleep. And as long as the challenge remains to squeeze the last increment of usable fiber out of the process of turning logs into panels, they never will. ■

FIG. 1—1982 plywood prices, production



sota placed into effect in August 1982 an 0.5 ppm ambient standard applying to all new constructed housing units (mobile homes, single and multiple family housing, and health care facilities) at time of sale, and Wisconsin has proposed an 0.4 ppm ambient air standard for mobile homes.

As strict as they are, these levels are insufficiently low for consumer activists. In August, the Consumer Federation of America, which HPMA chairman Michael Speltz termed a Ralph Nader organization, petitioned the Consumer Product Safety Commission to limit emissions from pressed wood products to 0.05 ppm, and ban the use of urea formaldehyde resins in these products if manufacturers are unable to meet the standard.

The CSPC banned the use of urea formaldehyde foam insulation in February 1982, citing studies showing the product to be potentially carcinogenic. The foam has been used in an estimated 500,000 to 600,000 homes since 1973.

Formaldehyde emissions in panel manufacturing plants are also under scrutiny, with workplace exposure limitations foreseen. These are already common in Europe and are being scaled downward, with the result that serious economical and technical problems are expected among users and producers of formaldehyde and formaldehyde-containing products in countries with the most severe limits.

In the U.S., improved plant ventilation, adjusted resin formulations and increased use of alternative binders should diminish sensory irritation in panel plants, it was noted at the 16th International Particleboard Symposium last April in Pullman, Wash.

Particleboard and MDF

Production of mat-formed particleboard declined in 1982 to an estimated 2.4 billion ft² (¾-in. basis), according to the National Particleboard Assn. Production and shipments have fallen off each year since 1978, when high levels of 3.87 billion ft² in production and 3.72 billion ft² in shipments were attained. Mat-formed particleboard (as opposed to extruded) production in 1981 was tabulated at 2.93 billion ft² from 51 plants, 31 in the South and East and 20 in the West.

Medium-density fiberboard (MDF) production, which traced an up-and-down path substantially above the 500 million ft² mark (¾-in. basis) from 1978 through 1981, dropped in 1982 as well. NPA estimated output last year in the 450 to 470 million ft² range. In 1981, production was 529.9 million ft² from 11 MDF plants, eight in the South and East and three in the West.

Hardboard

Hardboard plants in the U.S. and Canada last year shipped 5,586,918,000 ft² (⅛-in. basis), down from 6,104,000,000 ft² in 1981, according to American Hardboard Assn. figures. The 1982 shipment level represented 66% of total capacity, which amounts to 8,417,702,000 ft². The number of plants declined by one during the year to 27, operated by 16 corporations.

AHA has recently released two new ANSI standards: A135.4-1982 for basic hardboard and A135.5-1982 for prefinished hardboard paneling.

They replace product standards promulgated under U.S. Department of Commerce procedures, PS58 and PS59 respectively. Copies of the standards may be obtained for $1 each from AHA.

The association has also published a summary of data on the U.S. hardboard industry for the years 1972 through 1981. The 28-page compendium, which costs $195 per copy, contains information on product definition, types and markets; industry shipments (total and individually for paneling and siding); and plant capacities, characteristics and locations.

Producer associations

Ongoing efforts in product research and promotion, technical and quality assurance, public and governmental affairs, and statistics-keeping occupy the associations supported by panel manufacturers. An immense amount of literature is generated by these associations, ranging in varying measure from research and economic reports to product use brochures.

Here's a list of association names and addresses:

American Hardboard Assn.
887-B Wilmette Rd.
Palatine, Ill. 60067
(312) 934-8800

American Plywood Assn.
P.O. Box 11700
Tacoma, Wash. 98411
(206) 565-6600

Canadian Hardwood Plywood Assn.
27 Goulburn Ave.
Ottawa, Ont. K1N 8C7
(613) 233-6205

Council of Forest Industries
of British Columbia
Wood Products Division
1500/1055 W. Hastings St.
Vancouver, B.C. V6E 2H1
(604) 684-0211

Hardwood Plywood Manufacturers
Assn.
P.O. Box 2789
Reston, Va. 22090
(703) 435-2900

National Particleboard Assn.
2306 Perkins Place
Silver Spring, Md. 20910
(301) 587-2204

Waferboard Assn.
604-240 Duncan Mill Rd.
Don Mills, Ont. M3B 1Z4
(416) 445-3263 ■

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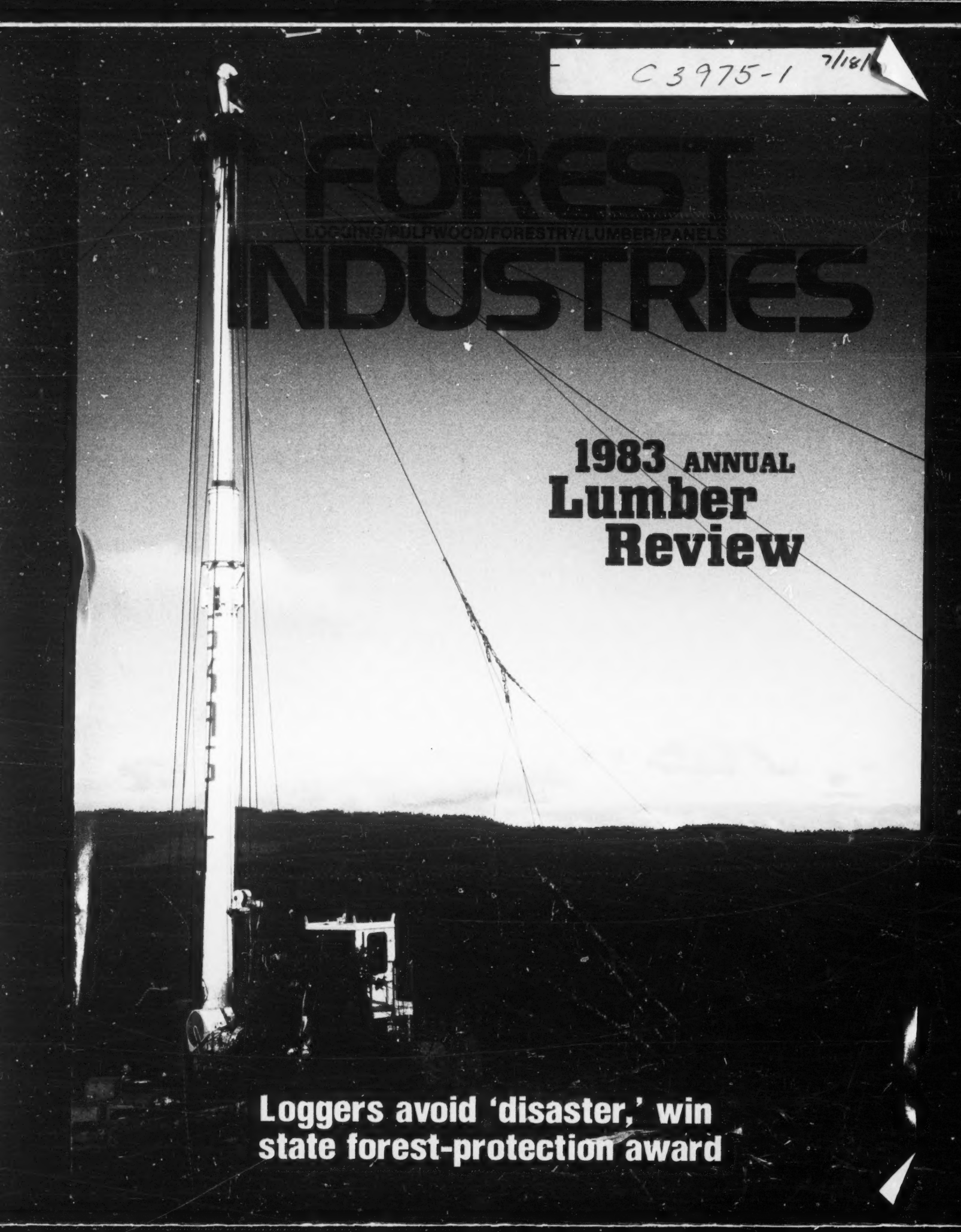
FOREST
LOGGING/PULPWOOD/FORESTRY/LUMBER/PANELS
INDUSTRIES



1983 ANNUAL Lumber Review

Loggers avoid 'disaster,' win state forest-protection award

1983 Volume 110 Number 7

JULY

Lumber Review

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Review of 1982 offers gloom, but '83 prospects offer hope to everyone
1982 Annual Lumber Review shows lowest production figures in modern times: U.S. lumber output was under 27 billion bd ft. Strong rebound shows lumber industry's cyclical nature

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NFPA plans to revamp income system, structure
Group needs more money to boost its ability to lobby Congress. Restructuring plan announced at annual meeting seeks to reach both these goals

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Increment borers will work for years if maintained well. Article offers use, repair tips
Getting cores from trees, poles, etc., is easy if borers are kept in good condition. Maintaining borers is important, but not very difficult

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U.S., German wood fairs produce different reactions, but both accent 'evolution'
SFPA Expo and Ligna-Hanover both are prime examples of their types of shows. 'Potential-buyer' crowds at both fairs agreeably surprised organizers

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Any southern pine sawmill can 'run' in a computer, thanks to a simulation model developed by a team at Mississippi State University; change mill conditions to see if profits rise

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More efficient peeling, lower costs resulted from mill modernization
Scotch Plywood Co. installed digital carriage drive and wood-heated veneer dryer at Beatrice, Ala., plant. Peeling efficiency rose while costs for drying and hauling veneer to layup plant fell

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Temporary log bridge aided timber harvest, avoided environmental 'disaster'
Farr Brothers Logging of Forest Grove, Ore., used innovative thinking to plan a timber harvest. Log bridge helped keep a creek clean, then logs went to the mill

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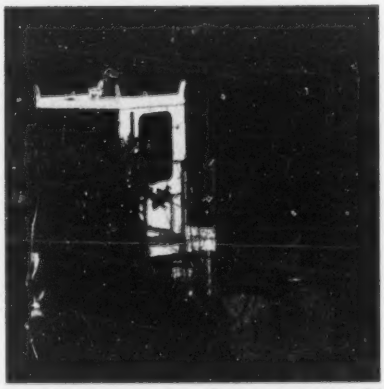

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1983 ANNUAL Lumber Review

Interest rates drove U.S. lumber production in 1982 below 27 billion bd ft, 70% of what it was a decade ago. Dramatic upturn has been sustained since Jan. 1, promising recovery

Lumber producers hail '83 rebound after terrible 1982

By David A. Pease

Atlanta, Georgia

As a review of U.S. lumber production in 1982, this report will deal with the lowest figures in modern times, when high mortgage interest rates collapsed the home building market. This dropped combined hardwood and softwood output for the year to 26.96 billion bd ft.

Last year's lumber production total included 21.883 billion bd ft of softwood lumber and 5.077 billion bd ft of hardwood lumber, according to National Forest Products Assn. statisticians. The total was 70.4% of the volume produced in 1973, when the combined softwood and hardwood tally was 38.297 billion bd ft.

As Table 1 shows, the 1973 peak was followed by a declining period which extended through 1975 before a late-Seventies recovery held production above 37 billion bd ft through 1979. That was the year of Black October, when many lenders temporarily went off the market in confusion following Federal Reserve Board action which, in the name of fighting inflation, sent interest rates skyward. When lenders returned to the mortgage market, the majority of prospective home buyers were unable to qualify for mortgages at the new interest rates, and despite a plethora of "creative financing" doodads, home building and new home sales virtually ceased. The rest, as they say, is history.

Lumber production in 1980, at a mark just under 32 billion bd ft, was close to the previous low point in 1975. Further mill closures and curtailments put the production figure below 30 billion bd ft in 1981, and below 27 billion bd ft last year.

Yet as everybody this side of Mars knows, bankers, builders and buyers returned from year-end holidays with the optimism of camp-meeting converts and the forest products picture has brightened considerably since then.

An understatement, you say? Okay, it has damn well turned around! *Eeeee-hah!* Is that better? Amazing what a few months of sensible interest rates will do.

New homes are popping up like toadstools after a heavy rain and lumber prices have recovered significantly from their 1982 depths (see Fig. 1). Money is the fuel for this engine, as the bankrupt victims of the recent unpleasantness well know.

New year brings new prices

Using the *Random Lengths* composite framing price as a guide, it's easy to see when things changed for the better. The first quarter of 1982 opened with the composite at $174 per thousand bd ft, slumping to $162 at mid-quarter and ending the period back at $174.

During the second quarter, the composite price ranged between $164 and $183, which at the end of June was to remain the high point until December.

The third quarter saw a retreat generally into the low $160s, reaching $155 before a bottoming-out point of $152 as the fourth quarter opened.

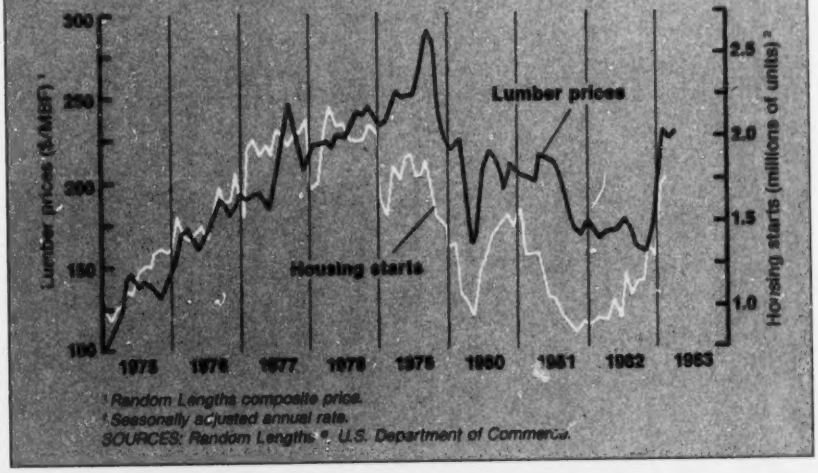
It was from that low point that the climb began, however, moving through the $160s and $170s and tying the late June figure of $183 in November before breaking the $190 barrier in December and ending the year at $197.

In 1983, of course, the price situation has changed dramatically. The *Random Lengths* composite framing figure had not been above $200 since August 1981, and it opened 1983 with $208 the first week, jumping to $230 and then $247 in consecutive weeks before settling back to the $220s and $230s (except for a $218 one week in March) as winter passed to spring. Then in May the number rose from $238 to $252 to $264.

What has transpired since then remains between the gentlemen in Eugene and their subscribers, thanks to the early deadline which is inherent in producing this monthly magazine.

NFPA publishes a monthly producer price index compiled by Copeland Economics Group Inc. The index is based on

FIG. 1—Housing starts and lumber prices



¹ Random Lengths composite price.
² Seasonally adjusted annual rate.
SOURCES: Random Lengths ®, U.S. Department of Commerce

1967 levels, considered as 100. Softwood lumber's December 1982 index stood at 320.6, 0.4% below December 1981. In January 1983 that index for softwood lumber advanced to 337.8 (5% above January 1982) and has since continued to rise: 362.8 in February (13.8% above February 1982) and 368.7 in March (15.6% above March 1982). Within this category, Douglas fir lumber registered the biggest percentage gains over year-ago index levels.

During 1982, the softwood lumber index fluctuated between 313.2 (in November) and 331.8 (in July), holding for the most part in the high 310s and low 320s. The average of the 12 monthly index figures for the year was 321.5.

Production jumps in '83

On to this year's production statistics. It takes a while for NFPA to collect stats from its federated producer associations and crunch the numbers into monthly reports, so we're not too current. But January's output of softwood lumber in this country was 25.2% above December's figure and a whopping 43.1% higher than the January 1982 level. Add in hardwood and the total was 23.8% above last December and 36.5% above January 1982.

That was the big jump. February's softwood production settled back a bit, less than 1% below January but still 38.5% above February 1982. Add in hardwoods and the February production figures were 3.1% below January but 29.8% above February 1982.

The two-month totals register 40.8% above last year for softwood lumber and 35.1% above last year for all lumber. Extrapolated into seasonally-adjusted annual rates, January production (hardwood and softwood) relates to 32.8 billion bd ft and February output to 31.3 billion bd ft.

The industry has been gaining momentum since those figures were reported, however. The actual figure this year would be higher than either of the annual rates calculated above if late spring rates of production can be sustained. At mid-year, NFPA projected 1983's lumber production at 32.6 billion bd ft—26.3 billion of softwood and 6.3 billion of hardwood. Here's a reading from two major regional producer associations:

- Southern Forest Products Assn. biweekly charts production, orders and shipments against a three-year average. Production this year through the week ended May 7 averaged 16% above the "normal" line for the three years, and for that last week alone production was 22% above normal.
- Through the first 19 weeks of 1983, production in the 12 western states tabulated by Western Wood Products Assn. averaged 92% of normal. Normal is defined by WWPA as 340 million bd ft, the average weekly production rate for the 728 active sawmills in the region. For the week ended May 14, western production was 98% of normal, said WWPA.

Another sign of recovery: both SFPA and WWPA have stopped issuing regular accounts of mill closure and unemployment statistics.

It's an uneasy recovery, though. Producers believe it is real because they have the orders, but like the mugging victim who thereafter sees an attacker in every doorway, it's hard to shake the memories of recent hard times and inaccurate recovery predictions.

The NFPA economics director, John Muench Jr., told members at the association's annual meeting in May that the federal deficit should not adversely affect housing this year, but mortgage rates still remain too high. It will be important to get the federal deficit under control, however, he stressed, adding that federal monetary policy will dictate how long the economic recovery can be sustained.

WWPA, incidentally, is predicting a total of 1.4 million housing starts for the nation this year, and total softwood lumber consumption for all uses of about 33 billion bd ft, an increase of 12%.

While some estimates of 1983 housing performance extend as high as 1.63 million starts, National Assn. of Home Builders still is predicting 1.45 million. The NFPA prediction is 1.55 million.

West/South shares vary

No startling variations in regional production trends are revealed by lumber production figures through 1982. Despite the South's inarguable designation as the nation's woodbasket-to-be, its forests are being called upon to supply pulp/paper and panel plants as well as sawmills. Lumber production figures suggest no dramatic trend changes.

Southern pine producers increased their share of the softwood lumber production total about 3% and western mills saw their share drop over 5% over the decade which ended in 1982, but January and February 1983 figures indicate a reversal:

Percent of softwood lumber production

	South	*West*
1972	25.5%	69.6%
1973	25.2%	69.7%
1974	25.5%	68.6%
1975	27.1%	67.2%
1976	25.9%	68.5%
1977	26.6%	68.1%
1978	26.8%	67.3%
1979	27.2%	66.4%
1980	27.7%	64.6%
1981	27.0%	65.3%
1982	28.3%	64.1%
Jan. '83	*25.0%*	*67.4%*
Feb. '83	*24.9%*	*67.4%*

Figures were calculated from NFPA reports. "South" represents production volumes from the southern pine region; "West" is a total of figures from Douglas fir, western pine and California redwood regions.

TABLE 1—United States Lumber Production

Year	Softwood Lumber Production, By Regions: Southern Pine	Douglas Fir	Western Pine	California Redwood	Other	Total Softwood Production	Total Softwood Consumption
1973	7.895	9.074	10.564	2.158	1.598	31.289	38.088
1974	6.921	7.777	8.973	1.895	1.627	27.193	32.082
1975	6.967	7.134	8.445	1.690	1.475	25.711	30.308
1976	7.598	8.322	9.789	2.001	1.633	29.343	35.753
1977	8.239	8.796	10.309	2.000	1.643	30.987	40.079
1978	8.267	8.845	10.033	1.902	1.852	30.899	41.435
1979	8.211	8.427	9.780	1.818	1.915	30.151	39.353
1980	6.880	6.815	7.613	1.589	1.903	24.800	32.499
1981	6.143	6.270	7.147	1.452	1.745	22.757	30.161
1982	6.186	5.783	6.803	1.433	1.678	21.883	29.388

Figures in recent years subject to revision.

Table 1 also shows softwood, hardwood and total lumber consumption for the 10-year period. Table 2 lists lumber import and export totals for the decade.

Fists across the border

The controversy over softwood lumber imports from Canada was an important part of the year's events, continuing into 1983 as efforts by a coalition of southern and western producers to persuade the federal government to impose a countervailing duty on Canadian lumber bore no fruit. The premise is that Crown stumpage prices, which are lower than comparable U.S. stumpage prices, represent an unfair subsidy and give Canadian mills an unfair advantage in U.S. markets.

Rubbish, say the Canadians, and so far the U.S. International Trade Administration and U.S. Court of International Trade have agreed.

Crown timber represents most of the supply in Canada, hence the focus on stumpage pricing differences. Our man in Washington, Luke Popovich, made this observation in *Forest Industry Affairs Letter* as the controversy was gaining momentum last fall:

"Charges that the Canadian government, which owns 95% of the resource, is 'giving away the raw material' below cost are nothing new. The full employment policies of the provincial and central governments have always been markedly different from our own, as stumpage price differences in part suggest. What is new is the prolonged housing slump that has shrunk the market for three years and made enemies of neighbors."

Formed to lobby for countervailing duties on Canadian lumber imports was the U.S. Coalition for Fair Canadian Lumber Imports, which numbers 600 members representing 35% of U.S. lumber production. Nine associations are members, most prominent among them SFPA. Absent are WWPA and NFPA, reflecting the lack of consensus among their members (among them some with Canadian mills) on the duty subject.

The coalition contends that a duty of 61% would be necessary to offset the alleged Canadian subsidies, and that 30% to 40% (depending upon who is quoted) of U.S. lumber consumption is being fulfilled by imports from Canadian mills. However, the accumulated legal and consultant costs through April were tallied at $750,000. It was estimat-

'82 hurt Canadian lumber firms

VANCOUVER, B.C.—North of the 49th Parallel, 1982 was about as bad a year as it was in the United States.

As Shoichi Nishiyama, chairman and chief executive officer of Crestbrook Forest Industries put it, the major occurrence of 1982 was "the arrival of Jan. 1, 1983." Crestbrook, headquartered in Cranbrook, B.C., recorded its largest loss in five years in 1982. Most Canadian forest industries faced similar seas of red ink as lumber markets hit bottom.

Canadian housing starts fell at about the same rate as the American slump, and lumber production in Canada fell again. The decline from 1981's levels was less severe than the drop from 1980 to 1981, however. In 1980, Canadian sawmills were putting out lumber at near-record levels: more than 18.9 billion bd ft, combining softwood and hardwood figures.

In 1981, output dropped 10.5% to a little under 16.9 billion bd ft. Last year, production fell an additional 7% to 15.75 billion.

Housing starts in Canada last year reached only 126,000, about half of the peak recorded in 1976. The U.S. start rate was cut nearly in half between 1978 (2 million) and 1982 (1.07 million). Since American homebuilding is the major consumer of Canadian lumber, the health of Canada's lumber industry depends on renewed U.S. homebuilding activity.

British Columbia is Canada's dominant lumber-producing province. In its forests grow about 7% of the world supply of softwoods, or about half of Canada's softwood stumpage. According to the B.C. Forest Service, the province's forests in 1982 contained nearly 8¼ billion m³ of mature standing timber.

In 1980, before the recession hit hard at Canada's lumber industry, B.C. alone supplied 6.3% of the softwood harvested in the world. That wood was turned into, among other things, nearly one-third of the world exports of softwood lumber in 1980.

B.C. retains its dominance of Canada's lumber industry. However, its lumber production fell more or less in line with the Canadian decline in general. Last year, B.C. sawmills produced 63% of Canada's lumber, the same share as in 1980.

Almost exactly half of this was sold in the U.S., according to statistics from the B.C. Council of Forest Industries. COFI reported that about 28% of B.C.'s lumber was sold in Canada. Lumber, of course, enters the U.S. duty-free. Plywood faces import duties of 15% to 20%; only 4% of B.C.'s plywood exports were to the U.S.

Forest products are by far Canada's largest source of foreign exchange. The country's positive trade balance on forest products (C$11.4 billion) was more than double the second-ranking array of products (metal ores and non-ferrous metals). Metals, food/grain and fisheries combined provided a trade surplus of C$9.6 billion, nearly C$2 billion less than that from forest products alone. ■

and Consumption, 1973-1982 (billion bd ft)

Hardwood Lumber Production, By Regions			Total Hardwood Production	Total Hardwood Consumption	Total Lumber Production	Total Lumber Consumption
Southern	Appalachian	Other				
3.397	1.304	2.307	7.008	7.467	38.297	45.555
3.265	1.268	2.371	6.904	6.784	34.097	38.866
2.761	1.109	2.002	5.872	5.791	31.583	36.099
3.033	1.171	2.213	6.417	6.441	35.760	42.194
3.063	1.207	2.410	6.680	6.890	37.667	48.969
3.242	1.228	2.527	6.997	6.997	37.896	46.432
3.452	1.261	2.581	7.294	6.939	37.445	46.292
3.314	1.211	2.533	7.058	6.272	31.858	38.771
3.074	1.309	2.452	6.835	6.479	29.592	36.640
2.362	0.894	1.821	5.077	5.108	26.960	34.496

Source: National Forest Products Assn.

TABLE 2—U.S. Imports & Exports of Lumber—1973-1982
(Billion bd ft)

	Imports			Exports		
	Softwoods	Hardwoods	Total[1]	Softwoods	Hardwoods	Total[2]
1973	9.002	0.547	9.560	1.773	0.208	1.994
1974	6.807	0.450	7.271	1.506	0.177	1.741
1975	5.711	0.224	5.945	1.373	0.166	1.618
1976	7.950	0.228	8.247	1.583	0.225	1.346
1977	10.380	0.341	10.729	1.412	0.223	1.666
1978	11.824	0.361	12.198	1.368	0.320	1.715
1979	11.118	0.376	11.523	1.745	0.307	2.142
1980	9.540	0.293	9.864	1.956	0.379	2.463
1981	9.205	0.291	9.521	1.878	0.406	2.372
1982	9.119	0.211	9.356	1.630	0.356	2.021

1. Includes railroad ties
2. Includes railroad ties, box shook
Source: U.S. Department of Commerce

ed another $300,000 would be necessary to finance an appeal, and signals were being transmitted from the coalition that it might shift its sights to Congress rather than pursue the matter with the U.S. Court of International Trade.

In Canada, the Canadian Softwood Lumber Committee was formed by 10 regional Canadian trade associations to fight the duty proposal. Widespread mill closures were predicted even with more moderate 5% or 10% duties. U.S. groups opposing the duty petition included the National Assn. of Home Builders, National Lumber & Building Material Dealers Assn., and North American Wholesale Lumber Assn.

The coalition also traces distribution patterns that indicate a strong flow of lumber by rail from Canada to consumers in the Midwest, South and Northeast. For several years, B.C. producers have shipped heavy cargo volumes of lumber to the U.S. Atlantic and Gulf coasts under a "subsidy" for which the U.S. Congress alone can be thanked—the Jones Act of 1920, which restricts waterborne shipments between U.S. ports to vessels of U.S. registry.

However one measures the situation, imports in total have grown to represent an increasing proportion of U.S. lumber consumption. Table 2 gives the volume numbers; here is the percentage of imports to consumption for softwood lumber, upon which the controversy focuses:

Softwood lumber imports as a percentage of consumption	
1973	23.6%
1974	21.2%
1975	18.8%
1976	22.2%
1977	25.9%
1978	28.5%
1979	28.2%
1980	29.3%
1981	30.5%
1982	31.0%

With the percentage of imports rising above 30% of U.S. lumber consumption for the first time in 1981, and gaining a half-percent in the killer year of 1982, it is reasonable to expect concern from domestic producers. And when one speaks of softwood lumber imports to the U.S., one is essentially speaking of imports from Canada, since last year Canadian imports made up 99.7% of the total and for the three preceding years that proportion ranged between 99.6% and 99.75%.

Building of new mills slows

While business has improved for lumber producers, it is unrealistic to expect a surge of capital expenditures from this segment of the industry. Economic pressure to recover more volume and/or value from each log has stimulated mill upgrading, with concentration on electronic process control measures. New mills which went on line in the past year include two computerized southern pine facilities, Hammermill Paper Co. at Tuscaloosa, Ala., and Georgia-Pacific Corp. at Ellabelle, Ga. At Camden, S.C., a new Camden Forest Products sawmill is scheduled for completion this fall.

In the West, Louisiana-Pacific Corp. will open a sawmill at Chilco, Idaho, this fall; Malheur Lumber Co. (a division of Ochoco Lumber Co.) has announced plans for a new sawmill at John Day, Ore.; Brazier Timber Co. is putting the finishing touches on a sawmill at Spanaway, Wash.; Evergreen Forest Products has a new sawmill at Tamarack, Idaho, and Wedeene River Contracting Ltd. is building a large sawmill at Prince Rupert, B.C., scheduled for completion in late 1985.

Most of the business news concerning sawmills this past year has involved changes in ownership. Edward Hines Lumber Co. hung out "for sale" signs on all its sawmills. Mills at Walden and Kremmling, Colo., and Saratoga, Wyo., were purchased by Louisiana-Pacific Corp., and a sawmill at St. Anthony, Idaho, was bought by Idaho Forest Industries, leaving Hill City, S.D., and three Oregon mills—Hines, John Day and Mt. Vernon—on the block. L-P also has offered to sell shut-down mills at Ione, Wash., and Salmo, B.C.

Masonite Corp. has transfered ownership of 10 sawmills to Timber Realization Co., a limited partnership of Masonite shareholders, for purposes of selling them. Manville Corp. has bought the Crown Zellerbach Corp. sawmill and plywood plant at Joyce, La.; Bohemia Inc. is the new owner of International Paper Co.'s Vaughn, Ore., sawmill and plywood plant; Roseburg Lumber Co. has agreed to purchase IP's Weed, Calif., sawmill complex; Croman Corp. of Medford, Ore., has bought McGrew Bros. Sawmill Co., Ashland, Ore.; Hanel Lumber Co. purchased the former Champion International Corp. Neal Creek sawmill near Hood River, Ore.; Jensen Lumber Co. now owns Hyampom Lumber Co., Hyampom, Calif.; and Container Corp. of America has added the Sullivan Lumber Co. sawmill in Preston, Ga., to its holdings.

In Canada, the biggest transfer was purchase of Crown Zellerbach Corp.'s 85% interest in Crown Zellerbach Canada Ltd. by Fletcher Challenge Ltd. of New Zealand. Canadian Pacific's CIP Ltd. of Montreal bought the remaining 50% interest in Tahsis Co., Vancouver, B.C., from East Asiatic Co. (Canada) Ltd., and Shell Canada Resources Ltd. has tried to sell its Elko, B.C., sawmill.

Random, er, thoughts

We have cribbed substantially from *Random Lengths* in indicating the way lumber prices have strengthened. *Random Lengths* is a copyrighted newsletter (plus ancillary electronic services) published in Eugene, Ore.

Constant readers of this annual review will notice the absence of our traditional company-by-company production tables and mention of our annual survey.

Just as associations have had to reduce services and companies have curtailed production, FOREST INDUSTRIES has felt the recent economic blitz and has reacted to it by applying a critical yardstick to the cost/benefit of various projects, some traditional and some new. And the lumber survey just didn't measure up this year.

The survey isn't dead, it's just resting. We'd be grateful if readers unhappy with its absence from this year's Annual Lumber Review issue would write to us so we can consider as many recommendations as possible when it's time to restore and/or reshape it. ■

Urban wood waste recovery: use and potential

BERKELEY, CALIF.—Broken wood pallets . . . clean chips from city tree pruning . . . 2x4s from demolition sites. In the past, they were carted to the dump and buried. But, increasingly, private firms and public agencies are finding that urban wood waste can be an asset, not a liability.

A one-day conference on urban wood waste recovery was held here recently, sponsored by the Assn. of Bay Area Governments (ABAG). The first of its kind in California, the conference drew a wide range of participants. Biomass energy users and planners, solid waste managers, landfill operators, recyclers, demolition company managers, tree service representatives, processing equipment manufacturers, foresters, local government officials and others came together to discuss ways to cut costs or make money by recovering wood waste.

TABLE 1—Total amount of wood waste produced annually in Bay Area
(rounded to nearest 1000 tons)

Urban wood waste generator	Volume	Data year
Tree companies	198,000	1977
Public street and park tree maintenance agencies	55,000	1978
Demolition companies	260,000	1977
Wood products manufacturers	234,000	1978
Sawmills	157,000	1978
Pallet users	69,000	1978
Construction	4,000	1977
Agriculture	243,000	1977

Volume is significant

Urban wood waste comes from a range of sources, each producing relatively small amounts. Yet, in the aggregate, the quantities of wood thrown away or unused become significant. In a 1978 survey of urban wood waste generators, ABAG estimated over 1 million tons of wood waste is produced annually in the San Francisco Bay Area (see Table 1).

Where are the markets?

The concept of urban wood waste recovery is an ideal. The reality is who's buying it now and who will buy it in the future.

Bernie Meyerson, president of Secondary Resources Development Consultants Inc., San Francisco, noted that "generators, aggregators, collectors and disposers" of urban wood waste rarely have a strong motivation for recovery and marketing of this material, "because such an activity is tangential to their primary operation."

Urban wood wastes come in different species, sizes, degrees of dryness, and levels of contamination. These characteristics affect its value, processing requirements and marketability. Salvaged building materials have a higher value as recycled construction material than as chipped fuel. Burning wood waste is a low-value use, but it may be the only feasible market for wood heavily contaminated by metal, masonry, dirt and paper.

Urban wood waste reuse can be divided into three categories:

- Energy.
- Landscaping and soil amendment.
- Secondary products.

Although burning wood to produce electricity is a low-value use, the demand for chipped or hogged wood fuel has increased modestly in the last few years in California. Jennifer Allen of the California Waste Management Board described four wood-burning projects in the state, one currently burning wood waste; three, when completed, will rely partially or totally on wood waste as fuel. She said there are problems with the present wood fuel market in California: the offered prices for wood fuel, about $22 to $28 per bone dry ton, do not reflect true heating value of wood. A true value, she said, would be based on Btu value of wood, or about $100 per ton. Companies that are recovering and processing wood waste for fuel are finding their operations only marginally feasible.

Dr. Clarence Gulueke of Recovery Systems, Richmond, who is a nationally recognized authority on composting, noted that chipped wood waste can be composted, taking advantage of wood's nutritional value. Or wood can be added as a bulking agent to other compostable materials. It gives porosity to compost piles.

Another use for urban wood waste is resale of used building materials. Extracting usable building materials from demolition sites once was a common practice for wrecking companies, but high labor costs and efficient mechanized equipment virtually have done away with hand wrecking and wood salvage. Judd Bosley of Cleveland Wrecking Co., San Francisco, said his company finds it difficult to salvage wood cost-effectively. But ever-increasing landfill disposal costs and travel distances, new kinds of compact wrecking equipment, and a trend toward interior remodeling may support future expansion of salvage of wood from demolition.

Processing wood waste

Marketing a product means meeting buyer specifications, and wood waste rarely is in the form needed for reuse. Usually, processing for size reduction or to remove unwanted materials is required. Processing may involve hand labor to remove nails or other imbedded

metal, or it may mean using machinery to reduce large and odd-size pieces to a small, uniform size.

Chippers are commonly used for green wood and tree trimmings. Mobile units have a throughput of anywhere from one to 15 tons per hour. They do not easily accept contaminants. Hogs usually are used for dry wood and will accept a certain amount of contaminants; models are available with capacities from one to 100 tons per hour. Tub grinders come in mobile or stationary models, and have an average throughput of 10 tons per hour.

The ultimate test, of course, is whether market prices for recovered wood waste will cover capital investment in a processing system and subsequent operating costs.

Energy case studies

Conference participants had an opportunity to hear about some companies and agencies that are recovering urban wood wastes and using them for energy production.

Eric Bettencourt, representing Tri-Valley Growers of Modesto, described his company's 4.2-megawatt facility, on line since 1981. Originally constructed to burn biomass wastes from agriculture and food processing, the plant also has burned wood as fuel in its Wellons combustion unit.

Chipped, dry wood and tree trimmings are purchased with the price per load computed according to moisture content. Wood below 10% mc is bought for $24 per ton. Green material may be worth only $16 per ton.

Using wood waste has not been without problems. Slag builds up in the combustion units if wood fuel is mixed with dirt and sand, Bettencourt said. Fuel cleaning equipment at Tri-Valley considerably reduced this problem.

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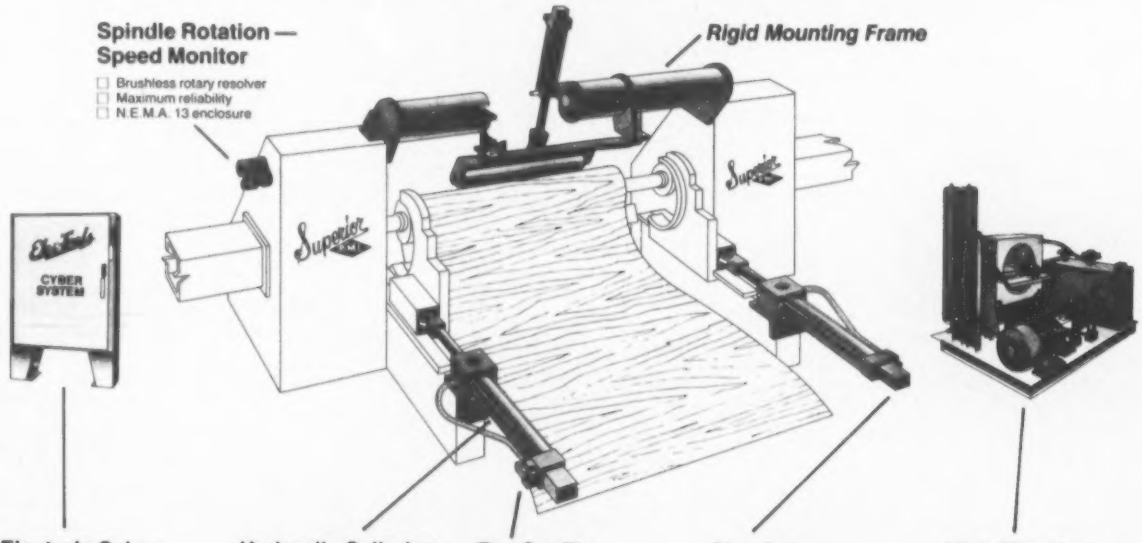

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in avoided cost paid for electricity by the local utility. The loss in revenue to Tri-Valley has forced the company to temporarily discontinue production of electricity and just produce steam for in-plant use.

The largest facility burning wood waste to produce power in the Bay Area is owned and operated by Louisiana-Pacific Corp. at Antioch. A 32-megawatt plant burns a ton of wood waste a minute, or 300,000 tons annually. Pacific Gas & Electric Co. buys the electricity, and L-P uses the steam in its manufacturing operations.

L-P has the capability to accept wood waste with more contaminants than most wood-burning facilities can accept. It gets wood fuel in chipped form from local processors of demolition and construction wastes, and it also uses discarded pallets and manufacturing wastes. Maximum price offered is $22 per bone dry ton of wood. The price drops as moisture content goes up.

The wood-burning facility has saved L-P considerable money on energy costs. The company is actively pursuing a second, similarly sized unit at the Antioch plant.

Power production by cities and counties has gained much attention in recent years. While there is no local government-owned wood-fired facility in California, it is being seriously considered.

Eugene Cone of the San Jose-based engineering consulting firm, Gibbs and Hill Inc., explained the results of a feasibility study of a wood-fired power plant completed by his firm for the city of Modesto. In Modesto, tree and yard wastes were projected to increase from 24,000 tons per year in 1983 to 94,000 tons per year by the year 2013. With these waste projections, the study looked at two sizes of wood-fired power plants, one requiring 110 tons per day (or about 40,000 tons annually) and one needing 150 tons per day (about 50,000 tons annually). Plants of these sizes would be in the 4 to 6-megawatt range.

The Modesto City Council has yet to act on the study findings. However, city staff are not optimistic that current economics will be favorable for a biomass facility.

Pollution controls

Wood-fired power plants must comply with the Federal New Source Review air pollution requirements, as administered by the local air district. Bill de Boisblanc, manager of New Source Review at the Bay Area Air Quality Management District, described the district's relevant standards; they will vary according to an air basin's attainment status.

Plants over a certain level of emissions must use Best Available Control Technology (BACT) to control pollution. BACT for wood-fired facilities will be determined on a case-by-case basis.

Louisiana-Pacific's plant is the first and only one of its kind in the San Francisco air basin. L-P had to show it would meet performance levels for particulates. The company also installed a scrubber for SO^2, as plans called for use of fuel oil as a backup.

Meeting air standards and paying for control equipment will be one of the most vexing problems facing wood-fired power plants in the future, particularly those located in urban areas.

Financing projects

Wood-fired power plants cost several million dollars to build. A processing system with wood handling and size reduction equipment may cost $100,000 or more. While public grants may help in a limited number of circumstances, private capital will be the primary source of funding.

Third-party financing is a financing strategy much talked about for alternative energy projects. Kirk Casselman of TXL Corp., San Francisco, identified three types of third-party financing: tax leverage lease financing, limited partnerships, and venture capitalists. The first of these is particularly promising for use with wood waste projects. It separates tax ownership from use of the facility, letting investors take advantage of available investment tax credits. Casselman noted that resource recovery or biomass projects usually are financed through so-called "shallow pockets" in which different participants contribute to building the credit support picture. ■

—By Linda Morse

THE AUTHOR is a senior regional planner with the Assn. of Bay Area Governments. Those wishing more information about ABAG's wood waste program or interested in buying the urban wood waste recovery conference proceedings ($2.50) should contact ABAG, Hotel Claremont, Berkeley, Calif., 94705; (415) 841-9730.

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Northern forests have made a great comeback since the twenties, but they are still currently underutilized. The problem is matching species and quality with demand

Frostbelt forests offer potential for improvement

Augusta, Maine

By Lloyd C. Irland

The frostbelt region extends from the Plains along the Ohio and its border states to the Atlantic. Its diversity of forests, land use, industrial base and political outlook make it less clearly a region than some other areas, and its forests have seen several waves of exploitation, frequent changes in ownership and radical shifts in timber markets since the earliest white settlements.

From the time of the mast trade to the turn of the century, the North led the nation in forest products. It was the home of all the early technology of lumbering, logging and papermaking. But by World War I it was well on the way to becoming a deficit region in all major forest products due to depletion of its pineries and low-cost timber sources elsewhere. During the noisy forest policy debates of the '60s and '70s, scarcely a word was heard of the conditions and potential in this region.

The North, home of half the nation's people, contains 34% of the nation's commercial land and produces an equal share of the nation's woodpulp. Maine and Wisconsin vie for national leadership in papermaking capacity. In the mid-'70s, the region still had 58.5% of the country's jobs in SIC 26, the paper and allied products industry group, down from 75% in 1947. In 1981, a year affected by a major recession, 575,000 persons worked in the lumber and paper industries (SIC 24 and 26).

The North displayed healthy growth in timber production from 1950 to 1979. Pulpwood output nearly tripled over the period, mostly in hardwood. The North is the only region of the continent that depends primarily on hardwood for its pulp. The region specializes in higher-quality, more demanding paper grades, forced to do so by the South's cost advantages in packaging. As a result, the North contains world-class white paper mills, relies heavily on making paper rather than pulp (even Maine imports pulp) and is the home of much of the nation's paper technology expertise based at industry, academic and government facilities.

Though the region's lumber production was essentially unchanged from 1950 to 1979, its share of the national total actually rose somewhat. During the 1970s, the industry saw significant startups of new mills and many modernizations. The development of markets for previously-unused species helped, as did the strong growth in demand for pallets and other hardwood products.

The region's leading lumber state is Pennsylvania, followed by West Virginia, Wisconsin, Maine and Kentucky. In softwood, the North is significant primarily as a market for other people's lumber—first from the South, later the West and now Canada.

In panels, the North has produced only a tiny quantity of softwood plywood and some particleboard for specialty applications. But in the late '70s, a series of forces led to a new boom in waferboard based on existing technology. In this development, Canada was ahead of the U.S. with the technology and the mills, but U.S. capacity has overtaken Canadian. While it may be several years before more waferboard capacity is built in the region, optimists (including the author) talk of more mills in the future and a flourishing export trade. Shipments have already been made to the U.K., Europe and the Far East.

Timber makes a comeback

Old growth liquidation in the late 1800s and early 1900s, overextended conversion to farmland, overgrazing, fire and rural depression left behind a depleted forest covering about 160 million acres, of which in 1920 the U.S. Forest Service estimated 35 million acres were "nonrestocking" and 54 million grew only cordwood.

Remarkable forest conservation progress has been made since the '30s, however. Fire control is excellent, insect and disease management have made great progress and vast acreages have been planted. Industry, state and federal forest lands are under formal management with prospects for varying degrees of upgraded management in the future.

The frostbelt's commercial forest acreage rose from 1920 to the early '50s. It then declined somewhat, but less than in any other region. Today, the region contains 34% of the nation's commercial timberland and 26% of the industrial ownership. The region has a lower proportion of timberland in federal ownership than any other, and is the only region in which state and local public ownership exceeds federal.

While the forest has been restoring itself, it has not always been restored with preferred species. The region has exploited its large aspen resource, but will face a huge growth surplus of that species. Though the northern hardwoods contain highly-valued species, many of the stands are of small size and low quality. Foresters find that the region's hardwoods have the irritating habit of occupying sites that can grow far more wood if occupied by conifers.

Timber trends in the North, 1952-1976
(billion ft³, growing stock)

		1952	1956	% Change
Softwoods:	Growth (net)	1.0	1.6	60
	Removals	0.6	0.7	17
	Ratio	1.6	2.3	43
	Inventory	27.6	44.6	62
Hardwoods:	Growth (net)	3.0	4.2	40
	Removals	1.5	2.0	33
	Ratio	2.0	2.1	5
	Inventory	83.6	128.6	54

Source: USDA Forest Service.

Timber production trends, northern region, 1950-1979

	1950	1979	% Change
Pulpwood production (million cords)			
Softwood	3.3	5.5	67
Hardwood	1.7	8.5	400
Total	5.0	14.0	180
Percent of U.S.	24	16	-33
Lumber production (billion bd ft)			
Softwood	2.0	1.4	-33
Hardwood	3.0	3.6	20
Total	4.9	5.0	2
Percent of U.S.	12.8	13.3	4

Source: USDA Forest Service, U.S. Timber Production, Trade, Consumption and Price Statistics, 1950-80. USDA Miscellaneous Publication 1408.

The region's spruce-fir forest is undergoing a severe inventory decline due to the spruce budworm.

An underutilized forest

The frostbelt forest has been outgrowing its wood markets. From 1952 to 1977, the region's total growing stock volume increased by 62% for softwoods and 54% for hardwoods—relatively faster than for the nation as a whole, especially for softwoods.

Even as the timber was quietly regrowing, small sawmills rusted in sideyards overgrown with grass as new homes were built with Douglas fir lumber and southern pine plywood. Northerners couldn't compete with the large, high-quality timber and low operating costs of the West and South. Northern paper mills were old, and served the slower growth markets.

The fast growth markets, in terms of product and population, were served by paper mills in the West and South that could draw on huge supplies of low-cost sawmill residues for increasing shares of their furnish.

By 1976, softwood growth was 2.3 times removals despite an 11% increase in removals since 1950. Hardwood growth was 2.1 times removals, though removals had grown by one-third. Despite mounting timber demands, inventory is projected to increase 79% for softwoods and 53% for hardwoods by 2030.

At a glance, these figures tell the story of an extremely underutilized forest. But there is more to the story. Some experts doubt that all of the private, non-industrial land will be available for harvest, and certainly the vast areas of tiny parcels may yield little other than an occasional pickup load of firewood. Others argue that, sooner or later, each tract will actually be cut.

Also, the late '70s have seen a boost in the use of wood from industrial ownerships for lumber, waferboard and pulp that is not reflected in recent federal data. It will take several years to measure this trend. At the same time, millions of cords have been added to the timber drain in the invisible flow to the region's firewood piles.

In some local areas, these trends have eliminated the comfortable growth cut surplus of the early '70s. They have prompted more foresters to think about timber supply, and more landowners to think about forestry.

Two more strategic facts about the frostbelt's forests are becoming apparent:

1. In many areas, the forest is excessively imbalanced in age structure. The recent measured growth contains a large measure of ingrowth that cannot be sustained. Where short-lived trees such as balsam fir and aspen are important to the local industry, it means that growth is likely to decelerate quickly. Some areas, such as northern Maine, will face drastic inventory declines as age and budworm carry off large volumes of fir before they can be cut.

2. Many areas are facing what Dean Gordon Baskerville of the Faculty of Forestry, University of New Brunswick, has called a problem of "quality renewal." Even where the aggregate inventory and growth cut figures look favorable in volume, too often there is a failure to renew timber quality. It is common to find overcutting in large diameter classes, which reduces the stock of high-grade logs. Where this is occurring, the aggregate figures can be misleading.

So the frostbelt forest as a whole, despite tight timber markets in some local areas, is underutilized. This is clearly so in terms of fiber tonnage and cubic feet, less so in board feet and sawlog quality as one traditionally thinks of it.

Outlook: terrific

Put simply, the North has long been a region of cheap stumpage, costly delivered logs and relatively costly lumber milling and papermaking. Thus its forests have been underused and its forest industry sector concentrates on specialty and high-technology items, and its paper industry is heavily concentrated in the city-oriented trades of boxes, envelopes and other converting businesses.

Cost balances are shifting, however. The North won't become the continent's absolute low-cost producer, but it will make more of its own lumber and other forest products. Rising freight costs assure this. Waferboard is leading this shift, and is not merely an isolated fluke. New technologies will emerge to overcome cost barriers, use new species (aspen wasn't even counted in the timber supply 50 years ago) and invent new products and processes. The energy market will consume more wood, in various forms.

By the year 2000, the North will have undergone a transition—based on more intensive forest management—which will see a new and vigorous wood-using industry that will help supply the region's material needs, supply needed employment and perhaps even contribute to the national trade balance.

The region's foresters are getting marching orders from company headquarters, bureaucratic leaders and landowners to increase growth. The base of practical experience and new technical knowledge is expanding. And better markets for pulpwood and fuelwood are enabling the application of truly intensive cultural regimes for the first time.

The frostbelt will change rapidly to a region where industrial growth is based on wood thanks to a new era of improved forestry. The rewards will go to those with the best timing, the best planning and the best marketing. ■

THE AUTHOR is State Economist for the state of Maine, and has contributed to this magazine previously on New England forest products utilization.

Recent timber inventory increases, major states, percent change in growing stock on commercial forestlands

State	Years compared	Percent change in growing stock Softwood	Hardwood
New York	1968-80	30	41
Pennsylvania	1965-78	24	22
Minnesota	1962-77	3	32
Ohio	1968-79	136	45
West Virginia	1961-75	79	21

This table is a sampling of forest survey reports released since the nationwide totals were prepared.